



Diskussionspapiere

Discussion Papers

Januar 2010

Numbers for Pascal: Explaining differences in the estimated benefits of the Doha Development Agenda

Sebastian Hess, Stephan von Cramon-Taubadel & Stefan Sperlich

Nr. 1001

Department für Agrarökonomie und RURale Entwicklung
Georg-August-Universität Göttingen
D 37073 Göttingen
ISSN 1865-2697



Haben Sie Fragen, wollen Sie an unserem Forschungsprojekt teilnehmen oder möchten Sie einen Kommentar zu diesem Beitrag geben? Wir würden uns über eine Nachricht von Ihnen freuen.

Kontaktadressen:

Dr. Sebastian Hess

Swedish University of Agricultural Sciences (SLU)

Department of Economics

P.O. Box 7013, SE-75007, Uppsala, Sweden

Sebastian.Hess@ekon.slu.se

Tel.: +46-18/67-1000

Fax: +46-18/67-3502

Prof. Dr. Stephan von Cramon-Taubadel

Georg-August-Universität Göttingen

Department of Agricultural Economics and Rural Development

Platz der Göttinger Sieben 5

37073 Göttingen

Tel.: +49-551/39-22872

Fax: +49-551/39-9866

scramon@gwdg.de

Prof. Dr. Stefan Sperlich

Georg-August-Universität Göttingen

Department of Statistics and Econometrics

Platz der Göttinger Sieben 5

37073 Göttingen

stefan.sperlich@wiwi.uni-goettingen.de

Tel.: +49-551/39-7350

Fax: +49-551/39-7279

Numbers for Pascal: Explaining differences in the estimated benefits of the Doha Development Agenda

Sebastian Hess, Stephan von Cramon-Taubadel and Stefan Sperlich

Abstract: Economists use partial and general equilibrium trade simulation models to estimate the impact of changes in domestic policies and international trade rules. During the WTO Doha Development Agenda (DDA) negotiations economists have produced many different estimates of the gains that would result from global trade liberalisation scenarios. However, these estimates differ quite widely even for apparently similar liberalisation scenarios. The result is confusion about the true magnitude of the gains from trade liberalisation, and a reduction in the perceived credibility of the theories and models that economists use. We apply meta-analysis to a dataset extracted from 110 studies that present simulated assessments of global trade liberalisation scenarios under the DDA. Initial meta-regression analysis demonstrates that covariates that capture model characteristics, the nature of the data used in the modelling exercise, and the nature of the simulated liberalisation scenarios can explain roughly one-third of the variance in the dependent variable ‘simulated global welfare change’. We test whether additional explanatory power can be obtained by adding information about the authors of the simulation studies. We find significant fixed effects for the top 20 authors in the field. We interpret this as evidence that leading authors in the field employ model specifications that reflect their individual preferences and beliefs about how economies function and the impact of liberalisation, specifications that are hidden in the complex interactions of simulations models and therefore difficult to capture in a meta-analysis. We use these results to generate a confidence interval for the gains that would result from trade liberalisation under the DDA.

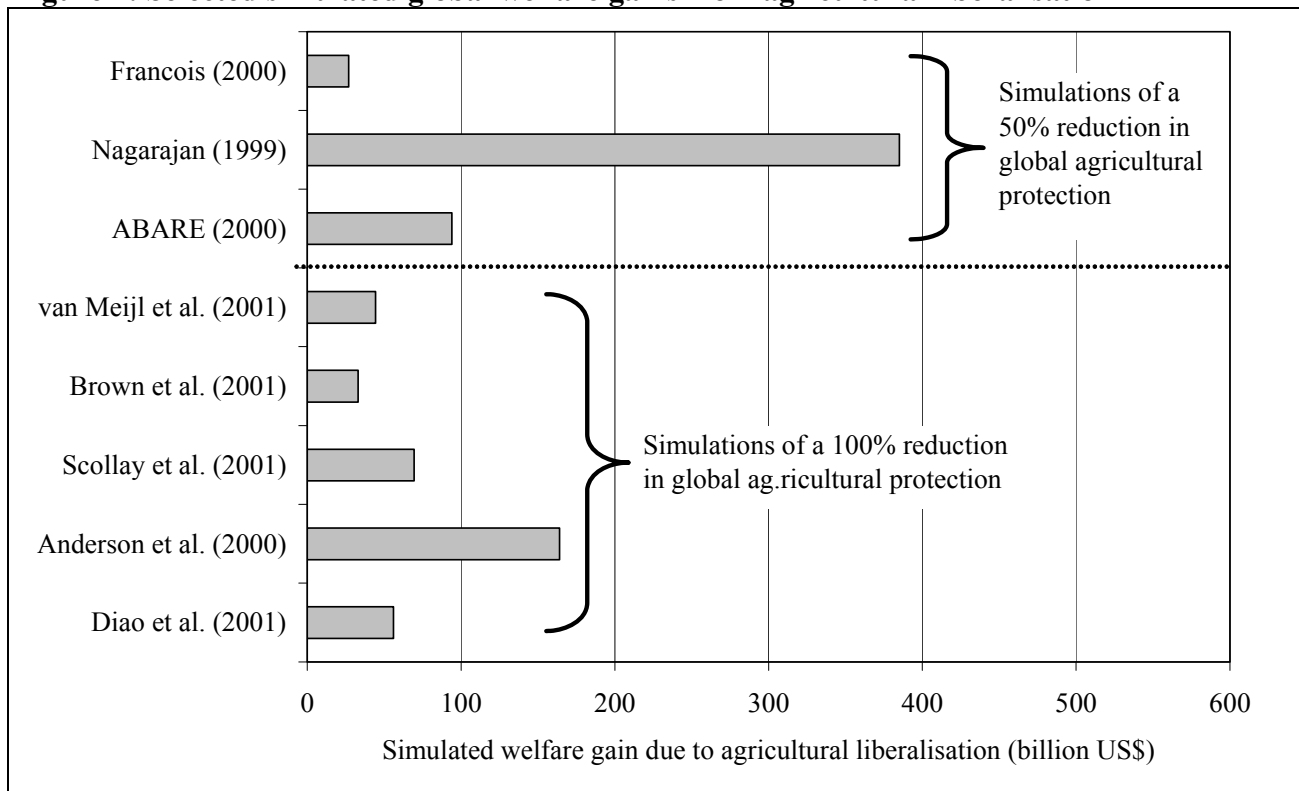
Keywords: Trade Liberalisation, Global Welfare Gain, Applied Trade Model, Meta-Analysis

“What members have let slip through their fingers is a package worth more than \$130 billion in tariff saving annually by the end of the implementation period, with \$35 billion saving in agriculture and \$95 billion in industrial goods. With developing countries contributing one third and benefiting from two thirds of the overall gains [this would be] a true development round ... with a rebalancing of the rules of the trading system in favour of developing countries.” Pascal Lamy, Director-General of the WTO¹

1. Introduction

Economists use partial and general equilibrium trade simulation models to estimate the impact of changes in domestic policies and international trade rules. Over the long and tortuous course of the WTO Doha Development Agenda (DDA) negotiations, economists have produced many different estimates of the gains that would result from global trade liberalisation scenarios.² However, these estimates differ quite widely even for apparently similar liberalisation scenarios. Figure 1 illustrates these differences for selected studies that simulate 50% and 100% reductions in agricultural protection.

Figure 1: Selected simulated global welfare gains from agricultural liberalisation



Source: UNCTAD (2003).

¹ See: WTO: 2008 News Items – Summary 29 July – Day 9: Talks collapse despite progress on a list of issues, www.wto.org/english/news_e/news08_e/meet08_summary_29july_e.htm, accessed January 28, 2010.

² For a recent example, see Adler et al. (2009).

The simulated global gains depicted in Figure 1 range from 30 to 380 billion US\$, and are not uniformly higher for the larger liberalisation step. Experts who know the models and modellers in question can provide explanations for some of the differences observed in Figure 1, but for others both inside and outside the economics profession these differences generate confusion about the true magnitude of the gains from trade liberalisation, and reduce the perceived credibility of the theories and models that economists use.

The purpose of this study is to contribute to our understanding of the factors that underlie the large differences among estimates of the gains from trade liberalisation. To this end we apply meta-analysis to a dataset extracted from 110 studies that present simulated assessments of global trade liberalisation scenarios under the DDA. Hess and von Cramon-Taubadel (2008) demonstrate that a meta-regression that includes model characteristics (M), the nature of the data used in the modelling exercise (D), and the nature of the simulated liberalisation scenarios (L) as covariates produces plausible estimates, but explains only roughly one-third of the variance in the dependent variable ‘simulated global welfare change’. However, trade simulation models are highly complex and embody many assumptions and parameters that are effectively hidden from the outside observer and therefore not amenable to inclusion in a meta-regression. Hertel (1999) refers in this context to the “model pre-selection” that modellers engage in before they produce simulation results. Even if modellers wanted to provide complete information on all aspects of this pre-selection, most publication outlets (journal articles, working papers, policy briefs, etc.) cannot provide the space that would be required to do so.

If pre-selection takes place, it could be expected to lead to author fixed effects in estimates of the gains from trade liberalisation. Each individual author could be expected to make similar sets of pre-selection decisions in the various simulation studies that he/she contributes to, and these studies would therefore all tend to report estimated gains that are higher or lower than the sample mean, all other things being equal. We test this hypothesis and find significant fixed effects for the top 23 authors in the field, who together have contributed to 77% of the 110 studies in the sample. We interpret this as evidence that leading authors in the field do indeed engage in model pre-selection that incorporates their individual beliefs about how economies function and how this should be modelled into their simulations.

2. Data and methodology

2.1 Data

Hess and von Cramon-Taubadel (2008) conduct a meta-analysis of the simulated welfare changes due to trade liberalisation scenarios that are reported in a representative literature sample of 110 studies. The literature sample was collected between December 2006 and August 2008 as outlined in Hess and von Cramon-Taubadel (2008). The sample covers the publication years 1996 through 2006 and includes not only peer-reviewed journal articles but also ‘gray literature’ such as reports and working papers by governments and NGOs that probably have more direct influence on policy

makers and other stakeholders.³ The 110 studies report on the results of 468 different simulation experiments and generate roughly 5800 individual measures of welfare gains at the country/region level. The meta-analysis reported in Hess and von Cramon-Taubadel (2008) regress these 5800 welfare gains on three sets of covariates that capture model characteristics (M), the nature of the data used in the modelling exercise (D) and the nature of the simulated liberalisation scenario (L).

2.2 The basic model

In this study we focus on global rather than national or regional welfare changes due to trade liberalisation scenarios. While policy makers will be primarily interested in estimates of the impact of trade liberalisation on welfare in their respective countries', large aggregate estimates of global welfare changes have been frequently cited by proponents of liberalisation to underline the case for global free trade. Hence, the meta-regression estimated in this study takes the general form:

$$\text{GWC} = f(\text{M}, \text{D}, \text{L}) + u \quad (1)$$

where GWC = global welfare change, M, D and L are the categories of covariates defined above, and u is a random error term. Various specifications of this general equation are estimated using the results of the 468 simulation experiments reported on in the 110 studies in our literature sample.

2.3 Specification of the dependent variable and the covariates

The studies in the literature sample report the dependent variable GWC in one of three different manners: (i) absolute change in GDP; (ii) percentage change in GDP, and (iii) percentage change in equivalent variation. We include dummy variables on the right hand side (RHS) of equation (1) to account for any systematic difference in these measures, with percentage change in GDP being the default. An additional dummy variable is included to identify studies that report a partial equilibrium (PE) measure of welfare plus government revenue. The following covariates are included in the categories M, D and L (descriptive statistics in Table 1):

Model characteristics (M): This category begins with a set of eleven dummy variables that distinguish between different types of general equilibrium (GE) models. These dummies indicate whether a GE model is single- or multi-country; whether it is comparative static or dynamic; whether it allows for capital stock accumulation; whether it assumes constant or increasing returns to scale (CRTS or IRTS); and whether it include low or high so-called Armington elasticities, where 'low' means that standard values from the Global Trade Analysis Project (GTAP) are used, and 'high' refers to any model that either assumes higher Armington elasticities or does not make the Armington assumption at all (thereby implicitly assuming perfect substitution and infinite Armington elasticities – see Sarker and Surry, 2006). Many combinations of these model characteristics are possible, but some do not occur in the literature sample, so only eleven are

³ A detailed bibliography of the studies included in the literature sample is available from the authors on request.

included on the RSH of equation (1). Although the interactions between these characteristics are complex, dynamics, IRTS, capital accumulation and high Armington elasticities are expected to lead to higher simulated welfare gains. Most single-country GE models assume fixed trade balances and exchange rates, and most do not allow for endogenous capital inflows. Hence they are expected to generate lower welfare gains than multi-country models.

Table 1: Descriptive statistics

Variable						Mean	Median	Min.	Max.	Std. Dev.	
Dependent Variable: Simulated global welfare change in mill. US\$						64118	17004	-98119	2587180	192120	
Dependent variable is absolute change in GDP (2001US\$)						0.120	0	0	1	0.325	
Dependent variable is % of baseline EV						0.103	0	0	1	0.304	
Dependent variable is sum of PE surplus and government revenue						0.098	0	0	1	0.298	
Category M (model characteristics)	Multi-country GE	Comp. static	CRTS	Capital accum.	Armingtons high 3*	0.034	0	0	1	0.182	
			CRTS		Armingtons low	0.135	0	0	1	0.342	
			CRTS		Armingtons high	0.013	0	0	1	0.113	
			IRTS	Fixed	Armingtons low	0.032	0	0	1	0.176	
			IRTS	Capital accum.	Armingtons low	0.073	0	0	1	0.260	
			IRTS	Capital accum.	Armingtons high	0.019	0	0	1	0.137	
		Dynamic	CRTS	Capital fixed	Armingtons high	0.006	0	0	1	0.080	
			CRTS	fixed	Armingtons low	0.132	0	0	1	0.339	
			CRTS	Accum.	Armingtons high	0.047	0	0	1	0.212	
	Single-country	Capital fixed			Armingtons low	0.028	0	0	1	0.165	
		Capital accumulation			Armingtons low	0.006	0	0	1	0.080	
	PE	Some primary factors modelled	Short run	No Armington	0.011	0	0	1	0.103		
				With Armington	0.077	0	0	1	0.267		
		...none modelled	Long run	With Armington	0.032	0	0	2	0.199		
				No Armington	0.006	0	0	1	0.080		
	One or more countries' trade balance fixed						0.094	0	0	1	0.292
	Length of dynamic simulation run						5.222	0	0	28	6.983
	[Length of dynamic simulation run] ²						75.927	0	0	784	144.102
	Length of pre-simulation projection of database						1.395	0	0	14	3.360
	Number of regions depicted						22.049	16	1	161	32.077
	Number of Sectors depicted						18.100	18	1	78	12.041
	Ad hoc modifications to elasticities						0.021	0	0	1	0.145
	Own econometric estimates of elasticities						0.024	0	0	1	0.152
Category L (liberalisation scenario)	Changes in tariff protection					-356045	-73279	-2801190	59342	557926	
	Changes in export subsidies					-28113	-343	-747241	148378	73025	
	Changes in blue and green box policies					-63953	0	-1409680	76670	186303	
	Changes in non-tariff barriers based on gravity models					-14317500	0	-1007890000	0.000	97711200	
	Changes in non-tariff barriers based on customs docs.					-39763300	0	-3023660000	0.000	274399000	
	Changes in non-tariff barriers based on price wedges					-2193	0	-438839	0.000	27535	
	Shocks to technical change or related variables					-2184	0	-618492	15455	32859	
Category D (database)	Database GTAP-3					0.143	0	0	1	0.351	
	Database GTAP-4					0.147	0	0	1	0.355	
	Database GTAP-5					0.342	0	0	1	0.475	
	Database GTAP-6					0.167	0	0	1	0.373	
	Non-GTAP database with bound tariffs					0.171	0	0	1	0.377	
	Non-GTAP database with applied tariffs					0.030	0	0	1	0.171	

* Models that depict three primary production factors.

Source: Own calculations with literature sample.

Four analogous dummy variables are included to distinguish between different types of PE models depending on: whether primary factors are modelled or not; whether the model is used to simulate

short-run or long-run reactions to liberalisation scenarios; and whether the model is based on the Armington assumption. Short-run simulations and the use of the Armington assumption are generally expected to lead to lower welfare gains, as are most simulations that explicitly model primary factors, because this usually involves the imposition of land or labour constraints.

Additional covariates in the category M include whether or not one or more countries' trade balances are assumed to be fixed, which is expected to lead to lower simulated welfare gains. The length in years of a dynamic simulation run is included to test the hypothesis that longer simulations generate larger welfare gains (van der Mensbrugghe, 2006). This variable is also included in quadratic form to allow for non-linearity, and for comparative static models the length of the simulation run is assumed to be zero. The length in years of any database projections that are undertaken prior to a simulation run is also included in category M; such projections are often undertaken to incorporate the impact of liberalisation steps that are assumed will take place prior to the liberalisation experiment that is the actual subject of the simulation. For example, before simulating of a DDA liberalisation scenario, a modeller working with a 2000 database might have projected this database ahead to incorporate the anticipated impact of the 'Fischler Reform' measures (support price reductions and the decoupling of direct payments to farmers) that the EU adopted in 2003. Such 'prior' liberalisation steps are expected to increase the welfare gains that result from a given DDA liberalisation scenario. The number of regions and the number of sectors depicted in a model are included as covariates in category M to test the hypothesis that aggregation is associated with averaging and weighing problems that lead to lower simulated welfare gains (Martin et al, 2003). Finally, one dummy variable indicates whether the authors of a study report that they have made *ad hoc* modifications to elasticities that they have taken from the literature or that are part of the modelling platform that they employ, and another similar dummy indicates whether the authors report using elasticities that they have estimated themselves. Authors can be expected to make such adjustments if they believe that 'standard' values are too large or too small. The impact of these covariates on simulated welfare gains is therefore ambiguous.

Liberalisation scenarios (L): It is not an easy matter to quantify liberalisation scenarios. Studies that claim to simulate the same reduction in tariffs, for example, can differ depending on whether bound or applied tariffs are considered, on the underlying aggregation, and on how preferences and tariff rate quotas are treated. These questions cause headaches not only for modellers but have also bedevilled the actual DDA negotiations on market access.

To quantify the size of liberalisation steps, we use a procedure described in detail in Hess and von Cramon-Taubadel (2008). According to this procedure the regional and product aggregation underlying each simulation in our literature sample is re-created using a comprehensive historical reference database on applied and bound tariffs, production volumes and trade flows. Consider a study that simulates the impact of an X% reduction in tariffs. We first use the reference database to derive the initial *ad valorem* MFN tariffs for all countries/regions and products/aggregate products covered in a study. The value of production for each product/product aggregate is multiplied by the

corresponding initial tariff to generate a monetary measure of the value of the each tariff. This in turn is multiplied by the X% reduction and summed over all products/aggregate products to create a standardised measure of the magnitude of the tariff reduction that the study simulates. Tariff reductions are expected to lead to welfare gains, *ceteris paribus*.

Changes in export subsidies are quantified in a similar manner using the reference database; the production value of the product in question is multiplied by the corresponding tariff rate (on the assumption that the price gap bridged by export subsidies can be approximated by the tariff that applies to the good in question) and the simulated percentage reduction in export subsidies. Reducing export subsidies is also expected to lead to welfare gains. Changes in blue and green box policies are approximated by multiplying the relevant production value by the reported proportional change in policy levels. Some PE models depict blue and green box policies in a more sophisticated manner, but our simple method reflect the simple way in which most GE models depict these policies. While reducing blue box policies is expected to increase welfare, green box policies are generally considered to be either welfare neutral (decoupled payments) or welfare enhancing (investments in productivity, infrastructure, etc.). Hence the combined impact of reducing blue and green box policies is ambiguous *a priori*.

Quantifying the size of a simulated reduction in non-tariff barriers (NTBs) is especially challenging, because most studies that analyse NTB reduction provide little information on the baseline NTB levels that they assume. The studies that do analyse NTB reductions in our literature sample all use one of three basic approaches to quantify NTBs: gravity models; reviews of customs documents; and observed price wedges (e.g. between cif and fob prices). We multiply the production values of the products in question with the proportional NTB reductions reported in a study as well as one of three dummy variables, one for each of the basic approaches to quantifying NTBs mentioned above. Reducing NTBs is expected to increase welfare, but the magnitude of this impact might differ according to how authors have quantified NTBs in the first place.

Finally in the category L we include a variable that captures exogenous shocks to technology or productivity that are assumed in some studies. This variable is defined as the product of the assumed proportional change in productivity and the production value of the affected products, and this variable is expected to be positively correlated with welfare gains.

Data (D): Six dummy variables are included to capture the impact of the different databases that modellers use. These are GTAP-3 through GTAP-6, and non-GTAP databases with bound and non-GTAP databases with applied tariffs. Due to progressive reductions in protection worldwide, earlier databases (e.g. GTAP-3) depict a world with higher protection. Hence, a given proportional liberalisation step simulated using such a database is expected to lead to higher welfare gains than the same step simulated using a later database (such as GTAP-6).

3. Results

3.1 Base model

Table 2 presents the results of the OLS estimation of the model in equation (1) using the covariates outlined in the previous section. Since the Breush-Pagan Test rejects the assumption of homoskedasticity ($p < 0.01$), we report White's robust standard errors. The first set of columns provides estimates for the entire literature sample of 110 publications, while the second set of columns provides estimates for a reduced sample of 107 publications from which three outliers (identified using Cook's distance measure) have been removed. The three 'outlier' studies report simulated global welfare gains from liberalisation that are up to four times as large as any others in our literature sample and based on either Brown et al. (2002) or Lodefalk and Kinnman (2006). The former model is characterised by a unique combination of features (IRTS and imperfect competition together with a fixed capital stock and high Armington elasticities, own estimates of NTBs and endogenous flows of foreign direct investment), while the latter employ an approach to modelling monopolistic competition in GTAP that, according to Hertel et al. (2006, p. 10), makes the model "less stable".

The results in Table 2 generally confirm the theoretical expectations formulated above. Models that employ high values of the Armington elasticities tend to simulate larger welfare gains from liberalisation. Longer dynamic simulation runs lead to larger estimates of welfare gains, while pre-simulation projections have the opposite effect. Larger tariff and export subsidy reductions are associated with larger welfare gains, as are simulation runs which include exogenous shocks to technical change. Models that employ earlier databases also simulate larger welfare gains. Overall, these results confirm those reported in Hess and von Cramon-Taubadel (2008). However, their analysis is based on roughly 5800 observations of simulated welfares change at the country/region level rather than 468 simulations of global welfare change as is the case here. The aggregation of country/region observations to global observations leads to loss of information and a considerable reduction in degrees of freedom, which explains why many coefficients in Table 2, despite having the expected signs, are not statistically significant.

Furthermore, the explanatory power of the base model reported in Table 2 is rather limited. The coefficient of determination for the full sample indicates that only about one third of the variance in simulated global welfare changes can be explained by the covariates included in the base model (adjusted $R^2 = 0.32$). This improves to 56% after the three outlier studies have been removed. In either case, a considerable proportion of the variation in simulated global welfare gains in our literature sample remains unexplained.

Table 2: OLS results for the estimation of equation (1)

Variable						Base model (110 studies)					Outliers removed (107 studies)					
						Coefficient	Standard error	t-value	p-value		Coefficient	Standard error	t-value	p-value		
Dependent variable is absolute change in GDP (2001US\$)						50643.6	15374.1	3.29	0.00	***	47525.4	14487.9	3.28	0.00	***	
Dependent variable is % of baseline EV						52354.9	19325.5	2.71	0.01	***	55305.5	14410.8	3.84	0.00	***	
Dependent variable is sum of PE surplus and government revenue						22265.9	27843.2	0.80	0.42		32339.1	14539.1	2.22	0.03	**	
Category M (model characteristics)	Multi-country GE	Comp. static	CRTS	Capital	Armingtons high 3	107821.0	103305.0	1.04	0.30		162603.0	58716.1	2.77	0.01	***	
			CRTS	accum.	Armingtons low	-26993.0	15898.2	-1.70	0.09	*	-15511.2	8155.8	-1.90	0.06	*	
			CRTS		Armingtons high	-141797.0	73610.3	-1.93	0.05	*	14306.3	19260.5	0.74	0.46		
			IRTS	Fixed	Armingtons low	-122742.0	71017.1	-1.73	0.08	*	-593.9	17701.7	-0.03	0.97		
			IRTS	Capital	Armingtons low	-74030.4	39293.1	-1.88	0.06	*	13909.6	13186.1	1.05	0.29		
			IRTS	accum.	Armingtons high	137178.0	72633.6	1.89	0.06	*	76551.6	42652.5	1.79	0.07	*	
		Dynamic	CRTS	Capital	Armingtons high	8407.9	61796.9	0.14	0.89		66300.7	46650.9	1.42	0.16		
			CRTS	fixed	Armingtons low	-88980.3	42288.2	-2.10	0.04	**	-14319.0	16336.2	-0.88	0.38		
			CRTS	Accum.	Armingtons high	-52655.6	43082.8	-1.22	0.22		30203.4	18235.9	1.66	0.10	*	
	Single-country GE	Capital fixed			Armingtons low	-16485.9	24687.5	-0.67	0.50		-21700.7	10916.5	-1.99	0.05	**	
		Capital accumulation			Armingtons low	-30634.6	19578.4	-1.56	0.12		-37713.7	25211.4	-1.50	0.14		
	PE	Some primary factors modelled	Short run	No Armington	-43953.8	36974.1	-1.19	0.24			-25940.9	16180.8	-1.60	0.11		
				With Armington	-52635.9	38656.3	-1.36	0.17		-38939.8	21179.0	-1.84	0.07	*		
			Long run	With Armington	-13919.5	22607.6	-0.62	0.54			-12821.0	12656.0	-1.01	0.31		
				No Armington	-29238.6	35763.7	-0.82	0.41			-5461.8	14361.5	-0.38	0.70		
	One or more countries' trade balance fixed						84155.6	89189.1	0.94	0.35		-23242.4	15308.2	-1.52	0.13	
	Length of dynamic simulation run						10988.6	4981.5	2.21	0.03	**	1586.2	1973.9	0.80	0.42	
	[Length of dynamic simulation run] ²						-603.7	223.7	-2.70	0.01	***	-194.0	127.8	-1.52	0.13	
	Length of pre-simulation projection of database						-4364.4	2062.4	-2.12	0.03	**	-4255.1	978.6	-4.35	0.00	***
	Number of regions * number of sectors						2.3	32.9	0.07	0.94		1.3	10.6	0.12	0.90	
	Ad hoc modifications to elasticities						-33339.2	43649.5	-0.76	0.45		-3752.3	15180.3	-0.25	0.80	
	Own econometric estimates of elasticities						-13214.3	19158.4	-0.69	0.49		10750.3	9690.4	1.11	0.27	
Category L (liberalisation scenario)	Changes in tariff protection					-0.16	0.08	-2.12	0.03	**	-0.06	0.01	-5.22	0.00	***	
	Changes in export subsidies					-0.46	0.44	-1.03	0.30		-0.29	0.12	-2.48	0.01	**	
	Changes in blue and green box policies					0.09	0.06	1.55	0.12		0.01	0.02	0.51	0.61		
	Changes in non-tariff barriers based on gravity models					0.00	0.00	-1.35	0.18		0.00	0.00	0.02	0.98		
	Changes in non-tariff barriers based on customs docs.					0.00	0.00	0.96	0.34		0.00	0.00	-0.74	0.46		
	Changes in non-tariff barriers based on price wedges					-0.06	0.05	-1.15	0.25		-0.01	0.04	-0.15	0.88		
	Shocks to technical change or related variables					0.13	0.04	3.14	0.00	***	0.17	0.02	8.31	0.00	***	
Category D (database)	Database GTAP-3					-13136.5	19879.6	-0.66	0.51		6661.5	10078.9	0.66	0.51		
	Database GTAP-4					72002.7	29848.4	2.41	0.02	**	33452.1	11730.2	2.85	0.00	***	
	Database GTAP-5					-13833.5	21129.8	-0.65	0.51		12520.4	5868.9	2.13	0.03	**	
	Database GTAP-6					-44979.1	35554.6	-1.27	0.21		6101.9	12630.5	0.48	0.63		
	Non-GTAP database with bound tariffs					23449.0	18833.9	1.25	0.21		9308.2	11078.3	0.84	0.40		
	Non-GTAP database with applied tariffs					3887.8	23920.7	0.16	0.87		-6117.5	12413.0	-0.49	0.62		
Mean of dependent variable						64118					43778					
Standard deviation of dependent variable						192120					75466					
Standard error of regression						158930					50086					
R ² (adjusted R ²)						0.370 (0.316)					0.596 (0.560)					
F-statistic (df1,df2)						14.57 (37,430)					17.13 (37,408)					

Source: Own calculations using literature sample

This is perhaps not surprising because many of the covariates outlined above are clearly at best rough approximations and proxies. In particular, many factors could only be included as qualitative variables. As outlined in Hess and von Cramon-Taubadel (2008), most studies do not provide comprehensive information on the exact parameter values used in a model, what modifications were made to the basic model and dataset, and how liberalisation scenarios were implemented. Failing such information, it was for example only possible to classify Armington elasticities into the categories ‘low’ and ‘high’. An attempt to contact authors via an internet survey and request more detailed information on the studies that they had published did not improve the situation notably; in many cases authors were not able, after several years, to exactly reconstruct how a particular simulation had been carried out. These deficiencies are to some extent understandable; many publication outlets for trade policy modelling studies do not provide sufficient space for a complete documentation of all relevant details, and most users of these studies are not interested or sufficiently versed in these details. Furthermore, as models become increasingly refined and databases are updated, it becomes increasingly costly for researchers to keep comprehensive records on old model versions and outdated databases, and it becomes increasingly unlikely that doing so will produce any future benefits.

3.2 Accounting for pre-selection effects

This leads us to explore additional explanatory variables that might capture some of the pre-selection effects discussed in the introduction. Some of these pre-selection effects will lead to measurement error in our explanatory variables. For example, it could be that by ‘high’ Armington elasticities one author means values that are three times as high as the standard GTAP values, while another author means values that are only twice as high. However, since many authors do not report exactly what they mean by ‘high’, we are only able to include a simple dichotomous effect in our meta-regression. However, pre-selection might also take place with reference to characteristics of models, databases and liberalisation scenarios that we have completely failed to account for but that influence simulation results in a systematic manner.

To test for the existence of pre-selection effects we consider three further specifications of the base model in equation (1). One of these includes publication fixed effects, one includes fixed effects for the lead author of a study, and one includes fixed effects for the most experienced author who has contributed to a study. In the following we explain these specifications and the results that they generate in greater detail.

Publication fixed effects: We are not able to include fixed effects for all 110 (107 without outliers) studies in our literature sample because some of these studies are characterised by unique combinations of the covariates already included in the estimation of the base model in equation (1). Hence, to avoid perfect collinearity only 86 individual dummy variables for publication fixed effects are retained.

Lead author fixed effects: We assume that the author named first on a publication is the lead author. Overall, 146 authors have contributed to the 110 studies in our literature sample, of which 71 appear as lead authors. After eliminating lead author effects that are perfectly collinear with the covariates that are included in the base model, we are left with 65 dummy variables for the lead authors listed alphabetically in Table 3. We see that individual lead authors have contributed as many as 58 and as few as one of the 468 observations that we extract from the 110 studies in the literature sample.

Table 3: Lead authors in the literature sample

First Author	Obs. in sample	First Author	Obs. in sample	First Author	Obs. in sample	First Author	Obs. in sample
Achterbosch	12	Conforti	11	Gilbert	4	OECD	2
Agbenyegah	6	Daude	1	Glismann	6	Peters	7
Ahmen	2	deCordoba	6	Gurgel	2	Poonyth	3
Anderson	46	Decreux	10	Harrison	8	Rae	4
Annabi	10	Dee	1	Hertel	12	Redmond	8
Antimiani	2	Dessus	1	Hoekman	2	Rege	4
Bchir	7	Diao	6	Hosoe	2	Shakur	2
Beghin	16	Dimaranan	4	Jensen	12	Shantong	4
Beutre	4	Elbehri	13	Jha	4	Sohinger	3
Bouët	5	Fan	2	Kerkelä	1	Terra	3
Bradford	1	Felloni	8	Kowalski	9	Tongzon	1
Britz	3	Flasbarth	6	Laird	4	Tumbarello	2
Brown	20	Fontagné	4	Lejour	4	Wahl	2
Cernat	3	Francois	58	Lips	11	Wang	3
Cheong	2	Frandsen	2	Lodefolk	12	vanMeijl	5
Chiang	4	Fugazza	3	Mai	15	Witzke	2
Chow	2	Ghosh	1	Matthews	6	Yu	3
Cockburn	4	Giblin	7	Nagarajan	3		

Source: Own depiction based on literature sample.

Most experienced author fixed effects: While the lead author is usually the individual who has coordinated or contributed the most to a study, this individual will not necessarily have had the most influence on the actual modelling of the liberalisation scenarios presented in that study. The internet survey that we carried out in an attempt to collect more information on model characteristics, databases etc. revealed that in some cases the lead author was not directly involved in the actual modelling at all. Many applied trade models have evolved over years under the auspices of particular researchers who appear relatively often in our literature sample. Analysis reveals that 23 of the 146 authors who have contributed to the studies in our sample, appear on 77% of these 110 studies and have contributed to 360 of the 468 observations on simulated global welfare gains that we extract from these studies. Most of these 23 authors are both familiar to anyone who has worked in the area of trade policy simulation (e.g. Harrison, Francois, Brown, Hertel) and many have fostered the development of particular modelling platforms or ‘schools’ over the years. Hence, these individuals will be responsible for many of any pre-selection effects in our literature sample.

To capture the influence exercised by these ‘most experienced authors’ (MEA) we rank all authors by the frequencies with which they appear as lead or co-authors in our literature sample. The MEA for a given study and the observations derived from this study is the author with the highest frequency of appearances. If all the authors who have contributed to a study have the same frequency ranking, this study is coded as having the MEA ‘other’. The results of this procedure are summarised in Table 4.

Table 4: Most experienced authors in the literature sample

Most experienced author	Obs. in sample	Most experienced author	Obs. in sample	Most experienced author	Obs. in sample
Achterbosch	9	Diao	6	Mai	15
Anderson	46	Elbehri	3	Other	108
Beghin	16	Francois	58	Wahl	14
Brown	20	Harrison	10	Wang	5
Chiang	4	Hertel	26	Van Tongeren	14
Cockburn	14	Jean	16	Vanzetti	24
Conforti	13	Laird	3	Yu	17
Decreux	10	Lips	13	Zhai	4

Source: Own depiction based on literature sample.

3.3 Results of specifications that include model pre-selection effects.

We re-estimate the base model in equation (1) augmented by the three different types of pre-selection variable defined above. Fixed effect estimation is used because it is very likely that the pre-selection effects that we hypothesise will be correlated with covariates in the categories M, L and D. A simple multinomial logit estimation of the MEA dummy variables on these covariates (available from the authors on request) confirms this is the case. Table 5 presents information on the goodness of fit for the base model and the augmented base models. Table 5 also presents results for weighted estimations of the base and augmented models in which each observation is divided by the sum of squared residuals over all observations taken from the same study. In this way the regression places greater weight on studies that produce results that have a smaller variance. Detailed tables that present the full results for each of the three augmented models are presented in Appendix Tables A (publication fixed effects), B (lead author fixed effects) and C (MEA fixed effects).

Adding a fixed effect for each individual publication clearly improves the explanatory power of the model. However, this specification is not very informative because it simply confirms that each publication is unique without providing any indication of what might be driving these differences. Adding lead author fixed effects also improves the fit of the base model considerably, albeit somewhat less than the publication fixed effects. However, the structure of the literature sample implies that lead author fixed effects (of which there are 65) are closely related to publication fixed effects (of which there are 86).

The specification with 23 MEA fixed effects is comparatively parsimonious and also improves the fit of the base model considerably. Furthermore, in the weighted estimations this specification performs almost as well or better than the other specifications, increasing the R^2 to 93% in the full sample. Appendix Table C reveals that inclusion of fixed effects generally leads to a larger number of the covariates in the base model being significant; the signs of the coefficients associated with these covariates are for the most part in accordance with expectations based on theory.

Table 5: Goodness of fit measures for models that include model pre-selection effects

Model	Full sample		Outliers removed	
	R^2	Adjusted R^2	R^2	Adjusted R^2
Base model (see Table 2)	0.37	0.32	0.60	0.56
Base model, weighted σ^2	0.84	0.83	0.65	0.62
Base model with publication fixed effects	0.59	0.45	0.77	0.68
Base model with publication fixed effects, weighted σ^2	0.94	0.92	0.70	0.62
Base model with lead author fixed effects	0.54	0.41	0.74	0.67
Base model with lead author fixed effects, weighted σ^2	0.95	0.94	0.71	0.64
Base model with MEA fixed effects	0.49	0.41	0.66	0.61
Base model with MEA fixed effects, weighted σ^2	0.94	0.93	0.74	0.70

Source: Own calculations based on literature sample.

3.4 Nonlinear versions of the base model and MEA fixed effects models

We next consider whether the explanatory power of the meta-regressions presented above could be improved by allowing for possible non-linearity. We re-estimate these regressions using three common transformations of the dependent variable, namely the Box-Cox, the Zellner and the Arcsin transformations (for a discussion see Linton et al 1997). Results are presented in Table 6 for the base model and the base model augmented by MEA fixed effects.

The results indicate that Box-Cox transformations with low λ -values lead to some improvement in the goodness of fit of estimations with the total sample (plus 10-12%). However, no notable improvements in goodness of fit are attained in the sample with outliers removed. This suggests that the strong non-linearity introduced by lower values of λ helps the meta-regression to fit the outlier observations.

4. Conclusion

Estimates of the benefits from global trade liberalization are frequently cited by economists and policy makers. However, estimates generated by trade policy simulation models vary considerably even for apparently similar liberalisation scenarios. We demonstrate that one-third to one-half of the variation in estimates of the benefits of liberalisation under the Doha Development Agenda can be explained using a meta-regression in which model characteristics, the database employed in a model, and information on the nature of the simulated liberalisation

scenario are used as covariates. We also demonstrate that adding fixed effects for the 23 most prolific authors in our literature sample improves the fit of these meta-regressions significantly. This is evidence that individual leading authors in the field engage in model pre-selection that incorporates their individual beliefs about how economies function and how this should be modelled into their simulations, and that this model pre-selection systematically influences the estimates of global welfare gains that they report.

Table 6: Goodness of fit of nonlinear versions of the base and MEA fixed effects models

Transformation of the dependent variable	λ	Base model				Base model with MEA fixed effects			
		Total sample		Outliers removed		Total sample		Outliers removed	
		R ²	Adj. R ²	R ²	Adj. R ²	R ²	Adj. R ²	R ²	Adj. R ²
No transformation	-	0.37	0.32	0.60	0.56	0.49	0.41	0.66	0.61
BoxCox	0.2	0.46	0.42	0.44	0.39	0.56	0.50	0.51	0.43
BoxCox	0.25	0.49	0.44	0.48	0.43	0.59	0.53	0.55	0.49
BoxCox	0.3	0.50	0.45	0.51	0.47	0.60	0.55	0.59	0.52
BoxCox	0.35	0.50	0.46	0.53	0.49	0.61	0.55	0.61	0.55
BoxCox	0.4	0.50	0.46	0.55	0.51	0.61	0.56	0.62	0.57
BoxCox	0.5	0.49	0.45	0.57	0.53	0.61	0.55	0.64	0.59
BoxCox	0.9	0.40	0.35	0.60	0.56	0.52	0.44	0.66	0.61
BoxCox	0.95	0.38	0.33	0.60	0.56	0.50	0.43	0.66	0.61
Zellner	0.35	0.37	0.32	0.60	0.56	0.49	0.41	0.66	0.61
Zellner	0.5	0.37	0.32	0.60	0.56	0.49	0.41	0.66	0.61
Zellner	0.9	0.37	0.32	0.60	0.56	0.49	0.41	0.66	0.61
Arcsin	0.35	0.37	0.31	0.61	0.57	0.49	0.41	0.67	0.62
Arcsin	0.5	0.37	0.31	0.61	0.57	0.49	0.41	0.67	0.62
Arcsin	0.9	0.37	0.31	0.61	0.57	0.49	0.41	0.67	0.62

Source: Own calculations based on literature sample.

Given the model specifications and data commonly used in our representative literature sample, a safe estimate of the gains that could be expected from global elimination of tariffs and export subsidies would fall between 100 and 230 billion 2001 U.S. dollars. The breadth of this range may appear disappointing at first glance. In view of the complexity of the world economy, the limited precision of the data that are available, the complications introduced by the aggregation of products and countries, and the incomplete nature of economic theory, it would perhaps be unreasonable to expect more precision.

Much more research is needed to develop stronger consensus on appropriate trade policy simulation models. In the meantime, improving standards of documentation and transparency is of paramount importance in the modelling field. The scientific community needs to establish a peer review system that is capable of ensuring the scientific quality of trade policy simulations when they are being used to support political decision making, rather than years later. Furthermore, given the variance in simulation results documented above, policymakers and economists should refrain from treating these results as facts.

References

- Adler, M., Brunel, C., Hufbauer, G.C. and Schott, J.J. (2009). *What's on the Table? The Doha Round as of August 2009*. Peterson Institute for International Economics Working Paper WP 09-6. <http://www.piie.com/publications/wp/wp09-6.pdf>
- Brown, D.K., Deardorff, A.V. and Stern, R.M. (2002). *Computational Analysis of Multilateral Trade Liberalization in the Uruguay Round and Doha Development Round*. Research Seminar in International Economics, Discussion Paper No. 489, Gerald R. Ford School of Public Policy Research Seminar in International Economics, University of Michigan.
- Hertel, T. W. (1999). *Future Directions in Global Trade Analysis*. Staff Paper #99-8, Department of Agricultural Economics, Purdue University.
- Hertel, T.W., Keeney, R., Ivanic, M. and Winters, L.A. (2006). *Distributional Effects of WTO Agricultural Reforms in Rich and Poor Countries*. Policy Research Working Paper No. 4060, The World Bank, Washington D.C.
- Hess, S. and von Cramon-Taubadel, S. (2008). A Meta-Analysis of General and Partial Equilibrium Simulations of Trade Liberalisation under the Doha Development Agenda. *The World Economy*, 31-6 (2008), pp. 804-840.
- Linton, O., Chen, R., Wang, N., Härdle, W. (1997): An Analysis of Transformations for Additive Nonparametric Regression: *Journal of the American Statistical Association*, Vol. 92, No. 440 (Dec., 1997), pp. 1512- 1521.
- Lodefalk, M., and Kinnman, S. (2006). *Economic Implications of the Doha Round*. Kommerskollegium – Swedish National Board of Trade, Governmental Report, Stockholm.
- Martin, W., van der Mensbrugghe, D. and Manole, V. (2003). *Is the Devil in the Details? Assessing the Welfare Implications of Agricultural Trade Reforms*. Contributed paper presented at the conference 'Agricultural policy reform and the WTO: where are we heading?', Capri, June 23-26.
- Sarker, R. and Surry, Y. (2006). Product Differentiation and Trade in Agri-Food Products: Taking Stock and Looking Forward. *Journal of International Agricultural Trade and Development*, 34(2): 39-78.
- van der Mensbrugghe, D. (2006). Estimating the Benefits: Why Numbers Change. In: Newfarmer, R. (Ed.), *Trade, Doha, and Development- A Window into the Issues*. http://siteresources.worldbank.org/INTRANETTRADE/Resources/Pubs/Trade_Doha_Development_A_Window_into_the_Issues.pdf

Appendix Table A: Base model with publication fixed effects

Variable						Base model (110 studies)					Outliers removed (107 studies)					
						Coefficient	Standard error	t-value	p-value		Coefficient	Standard error	t-value	p-value		
Dependent variable is absolute change in GDP (2001US\$)						1024520.00	509739.00	2.01	0.05	**	229730.00	105023.00	2.19	0.03	**	
Dependent variable is % of baseline EV						981408.00	589241.00	1.67	0.10	*	179267.00	114159.00	1.57	0.12		
Dependent variable is sum of PE surplus and government revenue						1440920.00	874572.00	1.65	0.10		240813.00	170535.00	1.41	0.16		
Category M (model characteristics)	Multi-country GE	Comp. static	CRTS	Capital accum.	Armingtons high 3	190716.00	426916.00	0.45	0.66		27109.90	195910.00	0.14	0.89		
			CRTS		Armingtons low	6044.99	5097.63	1.19	0.24		6926.70	4984.49	1.39	0.17		
			CRTS		Armingtons high	124886.00	121195.00	1.03	0.30		16117.90	51158.70	0.32	0.75		
			IRTS	Fixed	Armingtons low	508319.00	292139.00	1.74	0.08	*	7168.43	50538.90	0.14	0.89		
			IRTS	Capital	Armingtons low	561374.00	325566.00	1.72	0.09	*	63886.00	55850.90	1.14	0.25		
			IRTS	accum.	Armingtons high	241210.00	82246.90	2.93	0.00	***	138665.00	61562.10	2.25	0.02	**	
		Dynamic	CRTS	Capital	Armingtons high	726862.00	358347.00	2.03	0.04	**	195846.00	85216.70	2.30	0.02	**	
			CRTS	fixed	Armingtons low	58950.50	119755.00	0.49	0.62		-151337.00	27081.40	-5.59	0.00	***	
			CRTS	Accum.	Armingtons high	644007.00	354961.00	1.81	0.07	*	110945.00	72652.20	1.53	0.13		
			Single-country GE		Capital fixed	Armingtons low	-1235190.00	671589.00	-1.84	0.07	*	-365976.00	142421.00	-2.57	0.01	**
					Capital accumulation	Armingtons low	-1211880.00	671589.00	-1.80	0.07	*	-342663.00	142421.00	-2.41	0.02	**
	PE	Some primary factors modelled	Short run	No Armington	-1342920.00	736092.00	-1.82	0.07	*	-402225.00	162234.00	-2.48	0.01	**		
				With Armington	-1688660.00	952458.00	-1.77	0.08	*	-427869.00	200869.00	-2.13	0.03	**		
		...none modelled	Long run	With Armington	-1410460.00	855737.00	-1.65	0.10		-231958.00	166964.00	-1.39	0.17			
				No Armington	31328.00	17041.10	1.84	0.07	*	14075.50	1883.21	7.47	0.00	***		
	One or more countries' trade balance fixed						-1258930.00	1106320.00	-1.14	0.26		50745.90	219968.00	0.23	0.82	
	Length of dynamic simulation run						-165033.00	107975.00	-1.53	0.13		-6876.23	20151.10	-0.34	0.73	
	[Length of dynamic simulation run] ²						6856.99	4609.23	1.49	0.14		158.57	894.64	0.18	0.86	
	Length of pre-simulation projection of database						-26945.40	16694.60	-1.61	0.11		-2288.82	2705.57	-0.85	0.40	
	Number of regions * number of sectors						1100.56	884.53	1.24	0.21		-54.23	167.48	-0.32	0.75	
	Ad hoc modifications to elasticities						185818.00	193706.00	0.96	0.34		-78745.00	50317.70	-1.57	0.12	
	Own econometric estimates of elasticities						89805.10	57556.80	1.56	0.12		5169.73	10613.40	0.49	0.63	
Category L (liberalisation scenario)	Changes in tariff protection					-0.31	0.14	-2.30	0.02	**	-0.08	0.02	-4.76	0.00	***	
	Changes in export subsidies					-0.55	0.58	-0.95	0.34		-0.21	0.13	-1.59	0.11		
	Changes in blue and green box policies					0.07	0.07	0.97	0.33		0.03	0.02	1.37	0.17		
	Changes in non-tariff barriers based on gravity models					0.00	0.00	-1.79	0.07	*	0.00	0.00	0.06	0.95		
	Changes in non-tariff barriers based on customs docs.					0.00	0.00	1.43	0.15		0.00	0.00	-1.06	0.29		
	Changes in non-tariff barriers based on price wedges					0.00	0.04	0.06	0.95		-0.02	0.04	-0.58	0.56		
	Shocks to technical change or related variables					0.12	0.04	3.11	0.00	***	0.13	0.02	5.64	0.00	***	
Category D (database)	Database GTAP-3					30174.10	6191.73	4.87	0.00	***	38257.60	1172.35	32.63	0.00	***	
	Database GTAP-4					340105.00	276548.00	1.23	0.22		101102.00	87110.60	1.16	0.25		
	Database GTAP-5					-610084.00	413852.00	-1.47	0.14		43078.00	73991.40	0.58	0.56		
	Database GTAP-6					-405993.00	298357.00	-1.36	0.17		-2213.58	53204.90	-0.04	0.97		
	Non-GTAP database with bound tariffs					885914.00	491050.00	1.80	0.07	*	218227.00	107195.00	2.04	0.04	**	
	Non-GTAP database with applied tariffs					242477.00	91465.70	2.65	0.01	***	187173.00	32563.40	5.75	0.00	***	
Mean of dependent variable						64118					43778					
Standard deviation of dependent variable						192120					75466					
Standard error of regression						142509					42511					
R ² (adjusted R ²)						0.595 (0.450)					0.768 (0.683)					

Source: Own calculations using literature sample

Appendix Table B: Base model with lead author fixed effects

Variable						Base model (110 studies)					Outliers removed (107 studies)					
						Coefficient	Standard error	t-value	p-value		Coefficient	Standard error	t-value	p-value		
Dependent variable is absolute change in GDP (2001US\$)						205440.00	118097.00	1.74	0.08	*	17447.40	31477.90	0.55	0.58		
Dependent variable is % of baseline EV						1174400.00	759659.00	1.55	0.12		-84107.00	220486.00	-0.38	0.70		
Dependent variable is sum of PE surplus and government revenue						1298530.00	832372.00	1.56	0.12		-7695.28	251958.00	-0.03	0.98		
Category M (model characteristics)	Multi-country GE	Comp. static	CRTS	Capital accum.	Armingtons high 3	489750.00	324133.00	1.51	0.13		292044.00	104024.00	2.81	0.01	***	
			CRTS		Armingtons low	39203.70	71940.40	0.54	0.59		26759.50	19424.50	1.38	0.17		
			CRTS		Armingtons high	-109914.00	104331.00	-1.05	0.29		45045.20	26233.10	1.72	0.09	*	
			IRTS	Fixed	Armingtons low	178482.00	195793.00	0.91	0.36		35104.80	42326.80	0.83	0.41		
			IRTS	Capital	Armingtons low	154153.00	176198.00	0.87	0.38		35274.80	42037.80	0.84	0.40		
		Dynamic	IRTS	accum.	Armingtons high	271092.00	99774.00	2.72	0.01	***	139131.00	60156.50	2.31	0.02	**	
			CRTS	Capital	Armingtons high	-17130.20	147126.00	-0.12	0.91		120093.00	53256.20	2.26	0.02	**	
			CRTS	fixed	Armingtons low	-167212.00	125343.00	-1.33	0.18		-44376.20	37126.80	-1.20	0.23		
			CRTS	Accum.	Armingtons high	-50075.40	127420.00	-0.39	0.69		55054.70	27454.90	2.01	0.05	**	
			Single-country GE	Capital fixed		Armingtons low	1280640.00	810020.00	1.58	0.11		-26145.00	239843.00	-0.11	0.91	
	Capital accumulation			Armingtons low	1303950.00	810020.00	1.61	0.11		-2832.11	239843.00	-0.01	0.99			
	PE	Some primary factors modelled		Short run	No Armington	6784.38	6468.46	1.05	0.29		1657.88	1381.41	1.20	0.23		
				With Armington	-564245.00	241689.00	-2.33	0.02	**	-261442.00	87430.20	-2.99	0.00	***		
		...none modelled	Long run	With Armington	-7508.50	36069.20	-0.21	0.84		-9431.49	9441.54	-1.00	0.32			
	No Armington		25385.10	15346.70	1.65	0.10	*	11800.10	2045.68	5.77	0.00	***				
	One or more countries' trade balance fixed						-250991.00	257943.00	-0.97	0.33		-33254.50	52755.20	-0.63	0.53	
	Length of dynamic simulation run						33631.60	19028.50	1.77	0.08	*	2538.12	3709.55	0.68	0.49	
	[Length of dynamic simulation run] ²						-3104.01	1577.37	-1.97	0.05	**	-355.96	384.34	-0.93	0.36	
	Length of pre-simulation projection of database						-1971.81	10068.80	-0.20	0.84		-2853.44	2761.61	-1.03	0.30	
	Number of regions * number of sectors						87.48	147.97	0.59	0.55		-8.62	31.59	-0.27	0.79	
	Ad hoc modifications to elasticities						-146158.00	105069.00	-1.39	0.17		-23919.20	23920.40	-1.00	0.32	
	Own econometric estimates of elasticities						439.71	1145.54	0.38	0.70		600.78	326.84	1.84	0.07	*
Category L (liberalisation scenario)	Changes in tariff protection						-0.25	0.12	-2.11	0.04	**	-0.07	0.01	-4.68	0.00	***
	Changes in export subsidies						-0.42	0.59	-0.72	0.47		-0.31	0.11	-2.69	0.01	***
	Changes in blue and green box policies						0.13	0.08	1.66	0.10	*	0.03	0.02	1.57	0.12	
	Changes in non-tariff barriers based on gravity models						0.00	0.00	-1.77	0.08	*	0.00	0.00	0.13	0.89	
	Changes in non-tariff barriers based on customs docs.						0.00	0.00	1.03	0.30		0.00	0.00	-1.24	0.21	
	Changes in non-tariff barriers based on price wedges						-0.01	0.04	-0.14	0.89		-0.02	0.04	-0.59	0.56	
	Shocks to technical change or related variables						0.12	0.03	4.02	0.00	***	0.13	0.02	6.04	0.00	***
Category D (database)	Database GTAP-3						-166158.00	122866.00	-1.35	0.18		-93874.30	50872.80	-1.85	0.07	*
	Database GTAP-4						-138294.00	102067.00	-1.35	0.18		-68957.60	38521.70	-1.79	0.07	*
	Database GTAP-5						-212046.00	151302.00	-1.40	0.16		-104445.00	51560.70	-2.03	0.04	**
	Database GTAP-6						-236348.00	142137.00	-1.66	0.10	*	-61276.00	37514.10	-1.63	0.10	
	Non-GTAP database with bound tariffs						-1301790.00	816016.00	-1.60	0.11		21472.30	240553.00	0.09	0.93	
	Non-GTAP database with applied tariffs						32195.10	69185.40	0.47	0.64		87044.10	30044.60	2.90	0.00	***
Mean of dependent variable						64118					43778					
Standard deviation of dependent variable						192120					75466					
Standard error of regression						142509					43658					
R ² (adjusted R ²)						0.540 (0.411)					0.741 (0.665)					

Source: Own calculations using literature sample

Appendix Table C: Base model with most experienced author fixed effects

Variable						Base model (110 studies)					Outliers removed (107 studies)					
						Coefficient	Standard error	t-value	p-value		Coefficient	Standard error	t-value	p-value		
Dependent variable is absolute change in GDP (2001US\$)						67540.90	24430.40	2.76	0.01	***	64587.90	21872.10	2.95	0.00	***	
Dependent variable is % of baseline EV						39551.30	26283.40	1.50	0.13		21039.60	16271.00	1.29	0.20		
Dependent variable is sum of PE surplus and government revenue						61020.20	33397.80	1.83	0.07	*	55476.00	19691.90	2.82	0.01	***	
Category M (model characteristics)	Multi-country GE	Comp. static	CRTS	Capital accum.	Armingtons high 3	346129.00	256819.00	1.35	0.18		118879.00	64294.30	1.85	0.07	*	
			CRTS		Armingtons low	5266.36	21587.80	0.24	0.81		440.13	8929.23	0.05	0.96		
			CRTS		Armingtons high	-59295.60	55098.10	-1.08	0.28		32870.80	19292.70	1.70	0.09	*	
			IRTS	Fixed	Armingtons low	58907.10	47446.00	1.24	0.22		70064.90	33018.70	2.12	0.03	***	
			IRTS	Capital	Armingtons low	30970.10	44058.30	0.70	0.48		82565.50	29780.20	2.77	0.01	***	
			IRTS	accum.	Armingtons high	143073.00	71559.50	2.00	0.05	**	73397.90	43425.80	1.69	0.09	*	
		Dynamic	CRTS	Capital	Armingtons high	48495.40	68527.50	0.71	0.48		80791.10	50309.50	1.61	0.11		
			CRTS	fixed	Armingtons low	-39521.10	32597.30	-1.21	0.23		-31050.90	18028.10	-1.72	0.09	*	
			CRTS	Accum.	Armingtons high	160.73	39308.90	0.00	1.00		51829.60	19228.50	2.70	0.01	***	
			Single-country GE	Capital fixed	Armingtons low	-40064.60	24499.80	-1.64	0.10		-35305.50	13583.60	-2.60	0.01	***	
			Capital accumulation	Armingtons low	-18080.50	28599.40	-0.63	0.53		-46068.00	23890.60	-1.93	0.05	*		
			PE	Some primary factors modelled	Short run	No Armington	-68134.30	43012.00	-1.58	0.11		-57154.40	30702.70	-1.86	0.06	*
	With Armington	-90872.00			47217.60	-1.92	0.05	*	-88244.80	29300.20	-3.01	0.00	***			
	Long run	With Armington		-40539.10	26858.80	-1.51	0.13		-43469.20	15248.70	-2.85	0.00	***			
	...none modelled	No Armington	-25031.40	40172.00	-0.62	0.53		-13849.50	22730.40	-0.61	0.54					
	One or more countries' trade balance fixed						-176178.00	224884.00	-0.78	0.43		-5552.75	21651.90	-0.26	0.80	
	Length of dynamic simulation run						5212.43	3761.04	1.39	0.17		3195.30	2116.16	1.51	0.13	
	[Length of dynamic simulation run] ²						-451.47	186.47	-2.42	0.02	**	-315.10	132.07	-2.39	0.02	**
	Length of pre-simulation projection of database						-4403.60	2355.57	-1.87	0.06	*	-3797.99	1204.61	-3.15	0.00	***
	Number of regions * number of sectors						-3.91	75.87	-0.05	0.96		2.92	16.21	0.18	0.86	
	Ad hoc modifications to elasticities						17082.00	67918.90	0.25	0.80		-18571.00	14660.10	-1.27	0.21	
	Own econometric estimates of elasticities						32522.40	52536.60	0.62	0.54		-3203.52	13062.90	-0.25	0.81	
Category L (liberalisation scenario)	Changes in tariff protection						-0.18	0.08	-2.19	0.03	**	-0.06	0.01	-5.61	0.00	***
	Changes in export subsidies						-0.53	0.44	-1.21	0.23		-0.26	0.11	-2.35	0.02	**
	Changes in blue and green box policies						0.13	0.06	1.96	0.05	*	0.02	0.02	1.27	0.21	
	Changes in non-tariff barriers based on gravity models						0.00	0.00	-1.23	0.22		0.00	0.00	0.27	0.79	
	Changes in non-tariff barriers based on customs docs.						0.00	0.00	0.87	0.38		0.00	0.00	-1.01	0.31	
	Changes in non-tariff barriers based on price wedges						-0.02	0.04	-0.52	0.61		-0.01	0.04	-0.40	0.69	
	Shocks to technical change or related variables						0.12	0.03	3.72	0.00	***	0.14	0.02	8.64	0.00	***
	Category D (database)	Database GTAP-3						-2529.71	50470.80	-0.05	0.96		44979.00	28868.70	1.56	0.12
Database GTAP-4						5736.02	57008.60	0.10	0.92		33084.60	27067.10	1.22	0.22		
Database GTAP-5						-6523.74	45658.60	-0.14	0.89		32219.00	25944.10	1.24	0.22		
Database GTAP-6						-67325.30	55328.20	-1.22	0.22		5359.43	28666.60	0.19	0.85		
Non-GTAP database with bound tariffs						30771.80	34881.10	0.88	0.38		30385.60	22619.10	1.34	0.18		
Non-GTAP database with applied tariffs						12233.60	30761.40	0.40	0.69		11550.30	21821.50	0.53	0.60		
Mean of dependent variable						64118					43778					
Standard deviation of dependent variable						192120					75466					
Standard error of regression						147507					47306					
R ² (adjusted R ²)						0.486 (0.411)					0.659 (0.607)					

Source: Own calculations using literature sample



Diskussionspapiere (2000 bis 31. Mai 2006: Institut für Agrarökonomie der Georg-August-Universität, Göttingen)

0001	Brandes, Wilhelm	Über Selbstorganisation in Planspielen: ein Erfahrungsbericht, 2000
0002	Von Cramon-Taubadel, Stephan u. Jochen Meyer	Asymmetric Price Transmission: Factor Artefact?, 2000
0101	Leserer, Michael	Zur Stochastik sequentieller Entscheidungen, 2001
0102	Molua, Ernest	The Economic Impacts of Global Climate Change on African Agriculture, 2001
0103	Birner, Regina et al.	„Ich kaufe, also will ich?": eine interdisziplinäre Analyse der Entscheidung für oder gegen den Kauf besonders tier- u. umweltfreundlich erzeugter Lebensmittel, 2001
0104	Wilkens, Ingrid	Wertschöpfung von Großschutzgebieten: Befragung von Besuchern des Nationalparks Unteres Odertal als Baustein einer Kosten-Nutzen-Analyse, 2001
		<u>2002</u>
0201	Grethe, Harald	Optionen für die Verlagerung von Haushaltsmitteln aus der ersten in die zweite Säule der EU-Agrarpolitik, 2002
0202	Spiller, Achim u. Matthias Schramm	Farm Audit als Element des Midterm-Review : zugleich ein Beitrag zur Ökonomie von

		Qualitätssicherungssystemen, 2002
		<u>2003</u>
0301	Lüth, Maren et al.	Qualitätssignaling in der Gastronomie, 2003
0302	Jahn, Gabriele, Martina Peupert u. Achim Spiller	Einstellungen deutscher Landwirte zum QS-System: Ergebnisse einer ersten Sondierungsstudie, 2003
0303	Theuvsen, Ludwig	Kooperationen in der Landwirtschaft: Formen, Wirkungen und aktuelle Bedeutung, 2003
0304	Jahn, Gabriele	Zur Glaubwürdigkeit von Zertifizierungssystemen: eine ökonomische Analyse der Kontrollvalidität, 2003
		<u>2004</u>
0401	Meyer, Jochen u. S. von Cramon-Taubadel	Asymmetric Price Transmission: a Survey, 2004
0402	Barkmann, Jan u. Rainer Marggraf	The Long-Term Protection of Biological Diversity: Lessons from Market Ethics, 2004
0403	Bahrs, Enno	VAT as an Impediment to Implementing Efficient Agricultural Marketing Structures in Transition Countries, 2004
0404	Spiller, Achim, Torsten Staack u. Anke Zühlsdorf	Absatzwege für landwirtschaftliche Spezialitäten: Potenziale des Mehrkanalvertriebs, 2004
0405	Spiller, Achim u. Torsten Staack	Brand Orientation in der deutschen Ernährungswirtschaft: Ergebnisse einer explorativen Online-Befragung, 2004
0406	Gerlach, Sabine u. Berit Köhler	Supplier Relationship Management im Agribusiness: ein Konzept zur Messung der Geschäftsbeziehungsqualität, 2004
0407	Inderhees, Philipp et al.	Determinanten der Kundenzufriedenheit im

		Fleischerfachhandel
0408	Lüth, Maren et al.	Köche als Kunden: Direktvermarktung landwirtschaftlicher Spezialitäten an die Gastronomie, 2004
		<u>2005</u>
0501	Spiller, Achim, Julia Engelken u. Sabine Gerlach	Zur Zukunft des Bio-Fachhandels: eine Befragung von Bio-Intensivkäufern, 2005
0502	Groth, Markus	Verpackungsabgaben und Verpackungslizenzen als Alternative für ökologisch nachteilige Einweggetränkeverpackungen?: eine umweltökonomische Diskussion, 2005
0503	Freese, Jan u. Henning Steinmann	Ergebnisse des Projektes 'Randstreifen als Strukturelemente in der intensiv genutzten Agrarlandschaft Wolfenbüttels', Nichtteilnehmerbefragung NAU 2003, 2005
0504	Jahn, Gabriele, Matthias Schramm u. Achim Spiller	Institutional Change in Quality Assurance: the Case of Organic Farming in Germany, 2005
0505	Gerlach, Sabine, Raphael Kennerknecht u. Achim Spiller	Die Zukunft des Großhandels in der Bio-Wertschöpfungskette, 2005
		<u>2006</u>
0601	Heß, Sebastian, Holger Bergmann u. Lüder Sudmann	Die Förderung alternativer Energien: eine kritische Bestandsaufnahme, 2006

0602	Gerlach, Sabine u. Achim Spiller	Anwohnerkonflikte bei landwirtschaftlichen Stallbauten: Hintergründe und Einflussfaktoren; Ergebnisse einer empirischen Analyse, 2006
0603	Glenk, Klaus	Design and Application of Choice Experiment Surveys in So-Called Developing Countries: Issues and Challenges, 2006
0604	Bolten, Jan, Raphael Kennerknecht u. Achim Spiller	Erfolgsfaktoren im Naturkostfachhandel: Ergebnisse einer empirischen Analyse, 2006 (entfällt)
0605	Hasan, Yousra	Einkaufsverhalten und Kundengruppen bei Direktvermarktern in Deutschland: Ergebnisse einer empirischen Analyse, 2006
0606	Lülfs, Frederike u. Achim Spiller	Kunden(un-)zufriedenheit in der Schulverpflegung: Ergebnisse einer vergleichenden Schulbefragung, 2006
0607	Schulze, Holger, Friederike Albersmeier u. Achim Spiller	Risikoorientierte Prüfung in Zertifizierungssystemen der Land- und Ernährungswirtschaft, 2006
		<u>2007</u>
0701	Buchs, Ann Kathrin u. Jörg Jasper	For whose Benefit? Benefit-Sharing within Contractual ABC-Agreements from an Economic Prespective: the Example of Pharmaceutical Bioprospection, 2007
0702	Böhm, Justus et al.	Preis-Qualitäts-Relationen im Lebensmittelmarkt: eine Analyse auf Basis der Testergebnisse Stiftung Warentest, 2007
0703	Hurlin, Jörg u. Holger	Möglichkeiten und Grenzen der Qualitäts-sicherung

	Schulze	in der Wildfleischvermarktung, 2007
	Ab Heft 4, 2007:	Diskussionspapiere(Discussion Papers), Department für Agrarökonomie und RURale Entwicklung der Georg-August-Universität, Göttingen (ISSN 1865-2697)
0704	Stockebrand, Nina u. Achim Spiller	Agrarstudium in Göttingen: Fakultätsimage und Studienwahlentscheidungen; Erstsemesterbefragung im WS 2006/2007
0705	Bahrs, Enno, Jobst-Henrik Held u. Jochen Thiering	Auswirkungen der Bioenergieproduktion auf die Agrarpolitik sowie auf Anreizstrukturen in der Landwirtschaft: eine partielle Analyse bedeutender Fragestellungen anhand der Beispielregion Niedersachsen
0706	Yan, Jiong, Jan Barkmann u. Rainer Marggraf	Chinese tourist preferences for nature based destinations – a choice experiment analysis
		<u>2008</u>
0801	Joswig, Anette u. Anke Zühlsdorf	Marketing für Reformhäuser: Senioren als Zielgruppe
0802	Schulze, Holger u. Achim Spiller	Qualitätssicherungssysteme in der europäischen Agri-Food Chain: Ein Rückblick auf das letzte Jahrzehnt
0803	Gille, Claudia u. Achim Spiller	Kundenzufriedenheit in der Pensionspferdehaltung: eine empirische Studie
0804	Voss, Julian u. Achim Spiller	Die Wahl des richtigen Vertriebswegs in den Vorleistungsindustrien der Landwirtschaft – Konzeptionelle Überlegungen und empirische Ergebnisse

0805	Gille, Claudia u. Achim Spiller	Agrarstudium in Göttingen. Erstsemester- und Studienverlaufsbefragung im WS 2007/08
0806	Schulze, Birgit, Christian Wocken u. Achim Spiller	(Dis)loyalty in the German dairy industry. A supplier relationship management view Empirical evidence and management implications
0807	Brümmer, Bernhard, Ulrich Köster u. Jens- Peter Loy	Tendenzen auf dem Weltgetreidemarkt: Anhaltender Boom oder kurzfristige Spekulationsblase?
0808	Schlecht, Stehanie, Friederike Albersmeier u. Achim Spiller	Konflikte bei landwirtschaftlichen Stallbauprojekten: Eine empirische Untersuchung zum Bedrohungspotential kritischer Stakeholder
0809	Lülfs-Baden, Frederike u. Achim Spiller	Steuerungsmechanismen im deutschen Schulverpflegungsmarkt: eine institutionenökonomische Analyse
0810	Deimel, Mark, Ludwig Theuvsen u. Christof Ebbeskotte	Von der Wertschöpfungskette zum Netzwerk: Methodische Ansätze zur Analyse des Verbundsystems der Veredelungswirtschaft Nordwestdeutschlands
0811	Albersmeier, Friederike u. Achim Spiller	Supply Chain Reputation in der Fleischwirtschaft
		<u>2009</u>
0901	Bahlmann, Jan, Achim Spiller u. Cord-Herwig Plumeyer	Status quo und Akzeptanz von Internet-basierten Informationssystemen: Ergebnisse einer empirischen Analyse in der deutschen Veredelungswirtschaft

0902	Gille, Claudia u. Achim Spiller	Agrarstudium in Göttingen. Eine vergleichende Untersuchung der Erstsemester der Jahre 2006-2009
0903	Gawron, Jana-Christina u. Ludwig Theuvsen	„Zertifizierungssysteme des Agribusiness im interkulturellen Kontext – Forschungsstand und Darstellung der kulturellen Unterschiede“
0904	Raupach, Katharina u. Rainer Marggraf	Verbraucherschutz vor dem Schimmelpilzgift Deoxynivalenol in Getreideprodukten Aktuelle Situation und Verbesserungsmöglichkeiten
0905	Busch, Anika u. Rainer Marggraf	Analyse der deutschen globalen Waldpolitik im Kontext der Klimarahmenkonvention und des Übereinkommens über die Biologische Vielfalt
0906	Zschache, Ulrike, Stephan v.Cramon- Taubadel und Ludwig Theuvsen	Die öffentliche Auseinandersetzung über Bioenergie in den Massenmedien Diskursanalytische Grundlagen und erste Ergebnisse
0907	Onumah, Edward E., Gabriele Hoerstgen- Schwark and Bernhard Brümmer	Productivity of hired and family labour and determinants of technical inefficiency in Ghana's fish farms
0908	Onumah, Edward E., Stephan Wessels, Nina Wildenhayn, Gabriele Hoerstgen-Schwark and Bernhard Brümmer	Effects of stocking density and photoperiod manipulation in relation to estradiol profile to enhance spawning activity in female Nile tilapia
0909	Steffen, Nina, Stephanie Schlecht u. Achim Spiller	Ausgestaltung von Milchlieferverträgen nach der Quote

0910	Steffen, Nina, Stephanie Schlecht u. Achim Spiller	Das Preisfindungssystem von Genossenschaftsmolkereien
0911	Granoszewski, Karol, Christian Reise, Achim Spiller und Oliver Mußhoff	Entscheidungsverhalten landwirtschaftlicher Betriebsleiter bei Bioenergie-Investitionen - Erste Ergebnisse einer empirischen Untersuchung -
0912	Albersmeier, Friederike, Daniel Mörlein und Achim Spiller	Zur Wahrnehmung der Qualität von Schweinefleisch beim Kunden
0913	Ihle, Rico, Bernhard Brümmer Und Stanley R. Thompson	Spatial Market Integration in the EU Beef and Veal Sector: Policy Decoupling and Export Bans

**Diskussionspapiere (2000 bis 31. Mai 2006: Institut für Rurale
Entwicklung der Georg-August-Universität, Göttingen)**

Ed. Winfried Manig (ISSN 1433-2868)

32	Dirks, Jörg J.	Einflüsse auf die Beschäftigung in nahrungsmittelverarbeitenden ländlichen Kleinindustrien in West-Java/Indonesien, 2000
33	Keil, Alwin	Adoption of Leguminous Tree Fallows in Zambia, 2001
34	Schott, Johanna	Women's Savings and Credit Co-operatives in Madagascar, 2001
35	Seeberg-Elberfeldt, Christina	Production Systems and Livelihood Strategies in Southern Bolivia, 2002
36	Molua, Ernest L.	Rural Development and Agricultural Progress: Challenges, Strategies and the Cameroonian Experience, 2002
37	Demeke, Abera Birhanu	Factors Influencing the Adoption of Soil Conservation Practices in Northwestern Ethiopia, 2003
38	Zeller, Manfred u. Julia Johannsen	Entwicklungshemmnisse im afrikanischen Agrarsektor: Erklärungsansätze und empirische Ergebnisse, 2004
39	Yustika, Ahmad Erani	Institutional Arrangements of Sugar Cane Farmers

		in East Java – Indonesia: Preliminary Results, 2004
40	Manig, Winfried	Lehre und Forschung in der Sozialökonomie der Ruralen Entwicklung, 2004
41	Hebel, Jutta	Transformation des chinesischen Arbeitsmarktes: gesellschaftliche Herausforderungen des Beschäftigungswandels, 2004
42	Khan, Mohammad Asif	Patterns of Rural Non-Farm Activities and Household Access to Informal Economy in Northwest Pakistan, 2005
43	Yustika, Ahmad Erani	Transaction Costs and Corporate Governance of Sugar Mills in East Java, Indonesia, 2005
44	Feulefack, Joseph Florent, Manfred Zeller u. Stefan Schwarze	Accuracy Analysis of Participatory Wealth Ranking (PWR) in Socio-economic Poverty Comparisons, 2006