Trade-led Growth in Times of Crisis
Asia-Pacific Trade Economists' Conference
2-3 November 2009, Bangkok

Session 8

Tear Down this Wall:
On the Persistence of Borders in Trade

Volker Nitsch and Nikolaus Wolf

Asia-Pacific Research and Training Network on Trade

www.artnetontrade.org

Tear down this Wall!
On the persistence of borders in trade

Volker Nitsch (Darmstadt)

Nikolaus Wolf (Warwick and CEPR)

Motivation

- Frequent claims of a borderless world
- Empirical findings:
  - Borders matter (McCallum 1995, Engel & Rogers 1996)
  - Distance matters (Disdier & Head 2007)
- Can we remove the effect of borders?

Motivation

- We still don't know much about the origins of border effects

- Three main hypotheses:

1. Border effects due to political trade barriers
2. Border effects due to fundamentals
3. Border effects are an artifact (due to mis-measurement of distance)

H1: political barriers

- Border effects arise from political/ administrative barriers to trade
  - Tariffs, Quotas
  - Differences in standards
  - Currencies
  - Red tape
  - …

→ Border effect can be quickly and completely removed (given political/ administrative barriers are removed)

H2: fundamentals

- Border effects arise from differences in economic fundamentals that typically run along political borders
  - Ethnic/ linguistic or other networks
  - Infrastructure
  - Natural geography

→ Border is “endogenous”; border effects can only slowly be reduced, not entirely removed (Networks, Infrastructure)

H3: artifact

- Trade costs are highly nonlinear but this nonlinearity is general, not related to borders as such
  - Production is highly concentrated, shipments are highly localized: as within-unit distances are overestimated relative to between-unit distances we find artificial border effects

→ Border effect cannot be changed, unless trade costs are measured properly

This paper

- Consider German Unification to test H1-H3 to explore variation over time

- H1-H3 not mutually exclusive but
  - H1: quick change (near perfect removal of red tape etc.)
  - H2: slow change, never complete (infrastructure, networks)
  - H3: no change (location pattern)

This paper

- Estimate effect of former East-West border, controlling for effects of other administrative borders (Laender)
- Use data at two different levels of aggregation
- Use three different measures of distance


Test the West
©www.Topfoto.co.uk

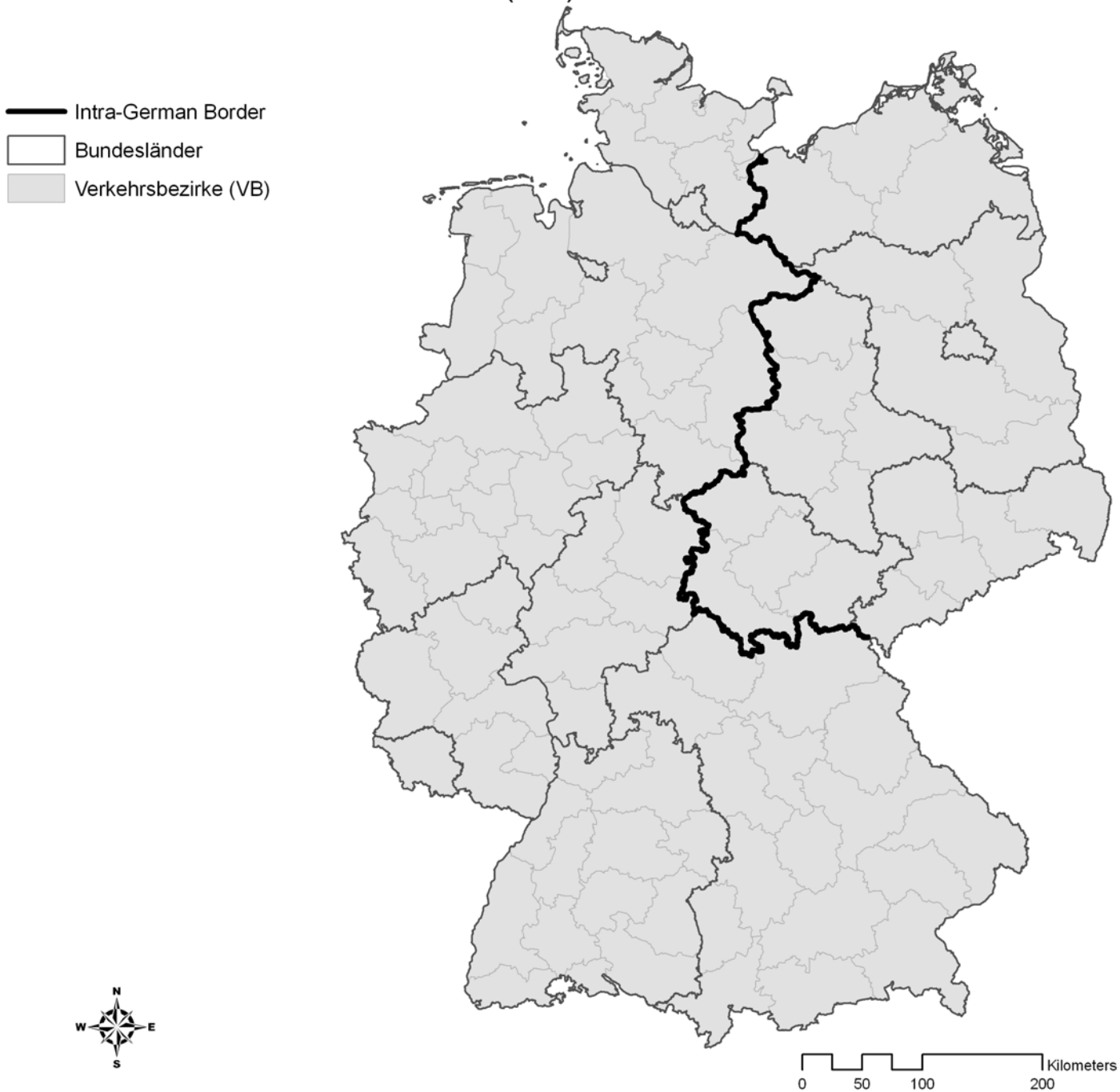
Data

- Intra-German freight transport by railway, sea and inland waterways from StatBAmt
- Intra-German freight transport by road from KBAmt
- 1995-2004, annual, in two different sets:
  - 101 districts (Verkehrsbezirke, VB), 10 product groups (Gueterabteilungen, ~ 1 digit)
  - 27 Regions (Verkehrsgebiete, VG) and 52 product groups (Gueterhauptgruppen, ~ 2 digit)

Classification of Regions

- E.g. Schleswig-Holstein (VG)
  - 8 districts (VB): Flensburg/ Ostsee, Husum/ Nordsee, Itzehoe, Kiel, Neumuenster, Eutin, Luebeck, Segeberg/Ratzeburg
- E.g. Bayern
  - 3 regions (VG)
  - 16 districts (VB)

The German Verkehrsbezirke (VB) and Bundesländer

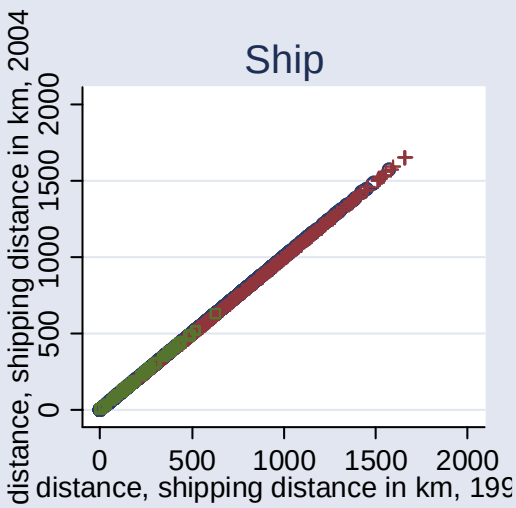


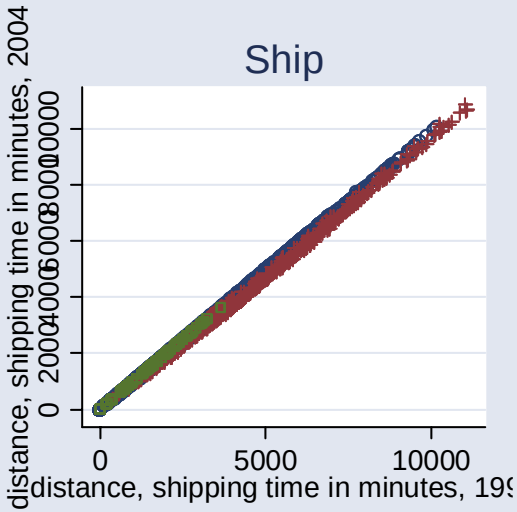
Classification of Products

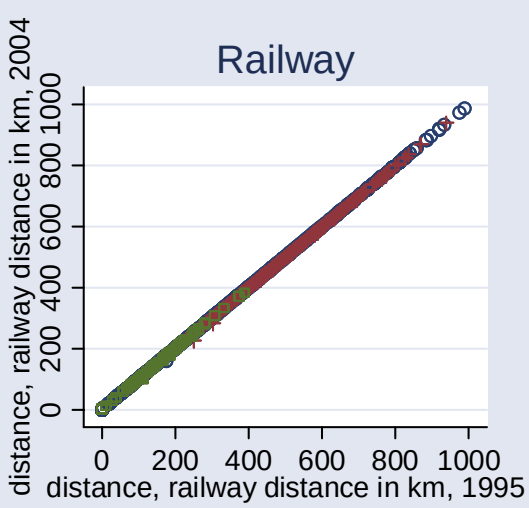
- Defined roughly by transportability
- 10 Gueterabteilungen
  - agricultural products and live animals; foodstuffs and animal fodder; solid mineral fuels; petroleum products; ores and metal waste; metal products; crude and manufactured minerals, building materials; fertilizers; chemicals; machinery, transport equipments and others
- 52 Gueterhauptgruppen as subdivisions

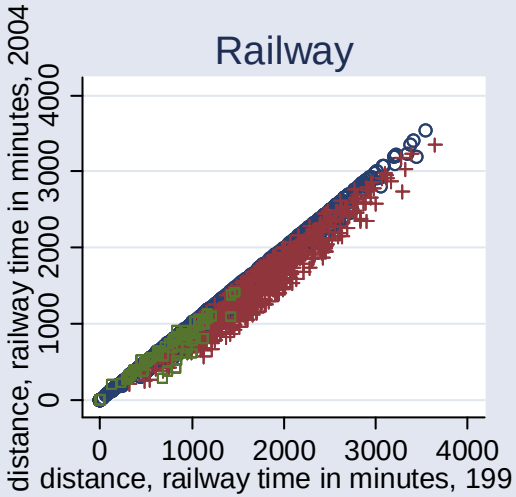
Distances

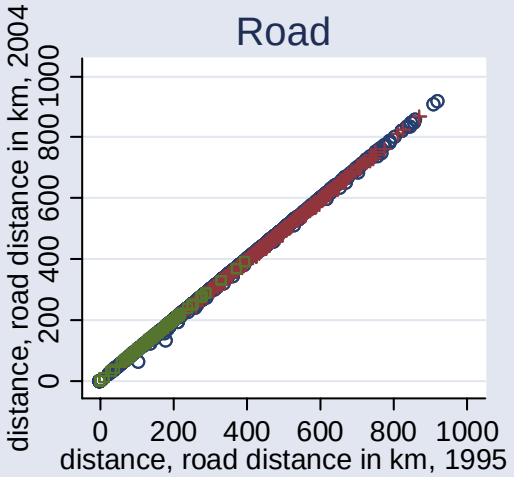
- by transportation mode
- three types of measures:
    1. air (invariant)
    2. travel time (on road, rail water)
    3. travel distance (on road, rail, water)
- 2 and 3 time-variant (1995, 2000, 2004)
    - from Office for Spatial Planning and Geoinformation (Büro für Raumforschung, Raumplanung und Geoinformation)

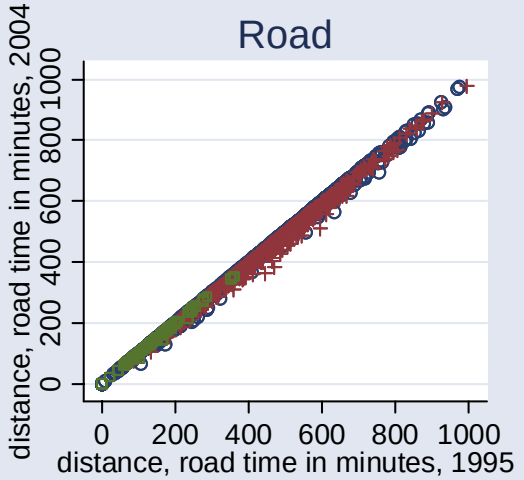








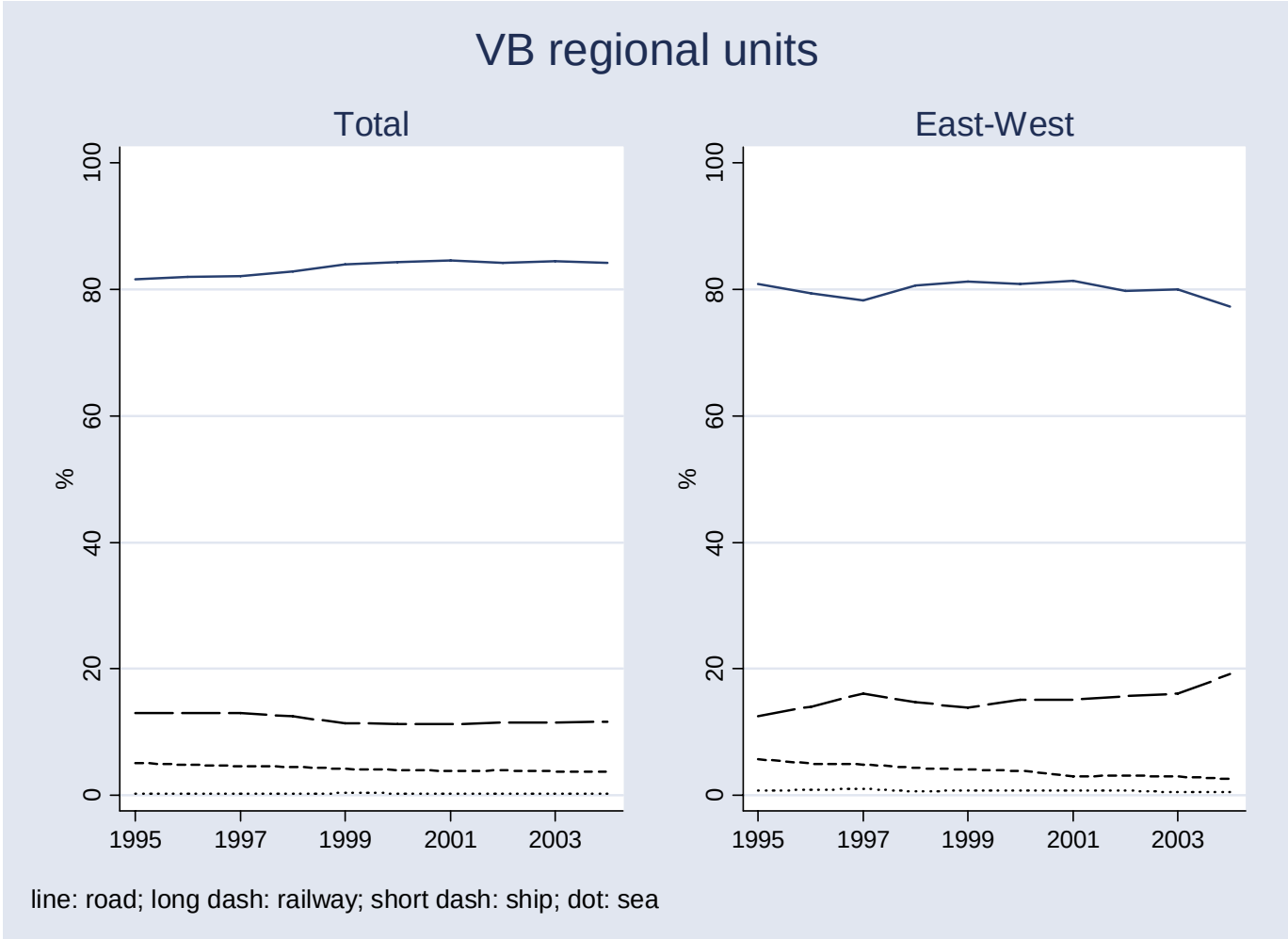




Variation over time

circle: west-west; plus: east-west; square: east-east

Transportation modes



Intermodal trade

- estimated shares of intermodal trade in total domestic in 2003 (StatBAmt):
  - rail: ~5-6%
  - domestic water: ~1%
  - road: ~7-8%
- potential bias from domestic trade on roads to domestic trade hubs where goods are reloaded to railways/ waterways:
  - Ludwigshafen/Mannheim, Cologne, Munich, Duisburg

Methods

- AvW-type gravity model:

$$X^k_{ijt} = \alpha + \beta_t \, EastWest_t + \gamma_t \, State_t + \sum_{it} \chi_{it} \, X_{it} + \sum_{jt} \delta_{jt} \, M_{jt} + \phi_{ij} \, Dist^k_{ijt} + \varepsilon_{ijt}$$

- Poisson ML (Santos Silva & Tenreyro, RESta 2006), robust clustered SE

Results

1. Pooled (using unit values from foreign trade)
   a. VB, VG, 3 distances
2. Transport Mode-specific
3. Industry-specific
   a. VB, 3 distances (100980 obs. each)
   b. VG, 3 distances (7270 obs. Each)
4. Check for Effect of Intermodal Trade
5. Test for impact of migration

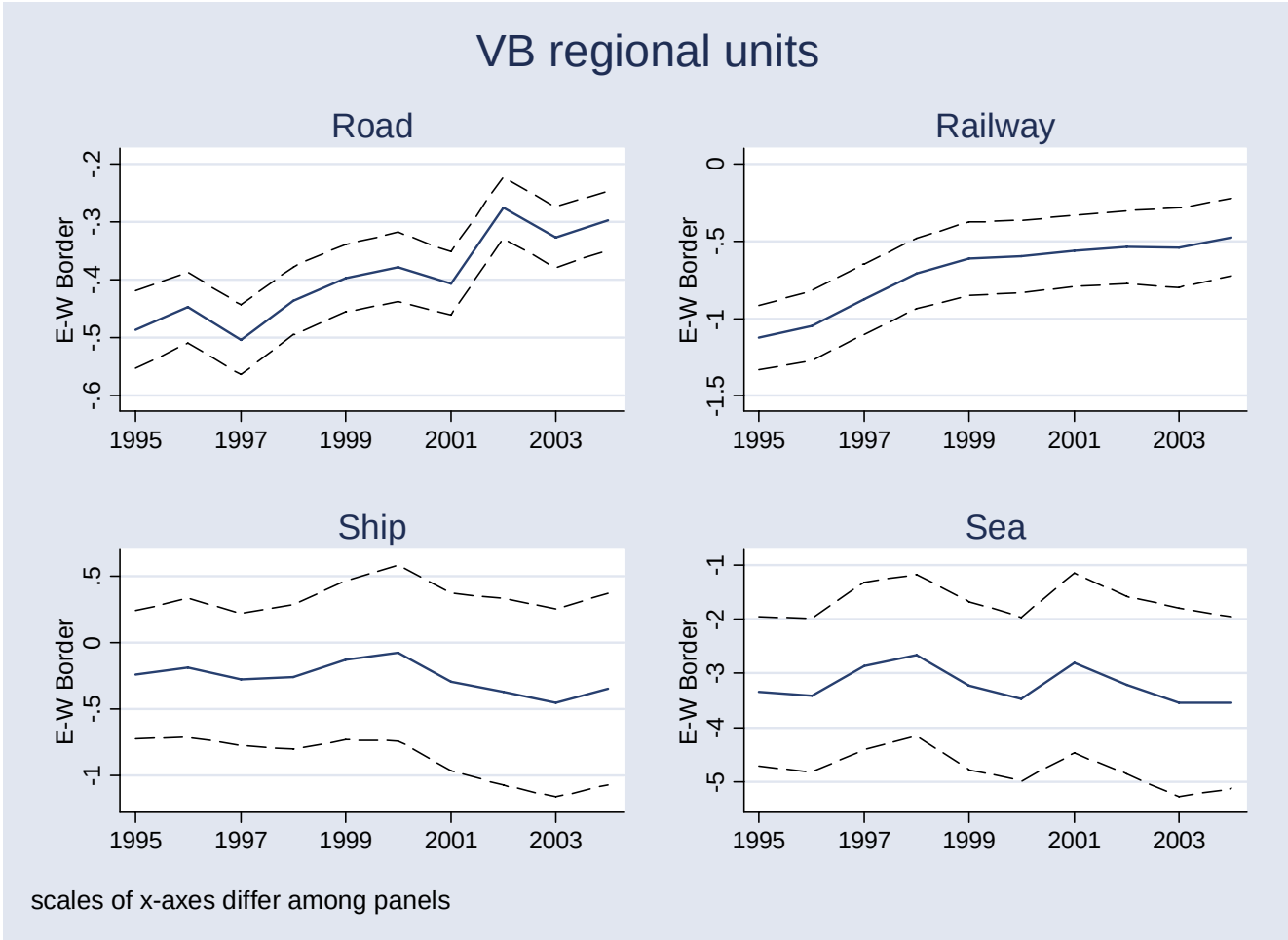
Results VB

E-W Border, 1995	-0.551	(0.034)	-0.542	(0.034)	-0.521	(0.034)
E-W Border, 1996	-0.511	(0.032)	-0.502	(0.031)	-0.480	(0.031)
…						
E-W Border, 2003	-0.363	(0.028)	-0.353	(0.028)	-0.333	(0.028)
E-W Border, 2004	-0.326	(0.027)	-0.317	(0.027)	-0.295	(0.027)
State Border, 1995	-0.687	(0.040)	-0.657	(0.039)	-0.650	(0.037)
State Border, 1996	-0.650	(0.038)	-0.619	(0.037)	-0.613	(0.035)
…						
State Border, 2003	-0.505	(0.038)	-0.474	(0.037)	-0.465	(0.036)
State Border, 2004	-0.531	(0.038)	-0.500	(0.037)	-0.492	(0.035)
Log Air Distance	-1.064	(0.025)				
Log Travel Distance			-1.079	(0.024)		
Log Travel Time					-1.271	(0.026)
R^2	0.74		0.76		0.77	

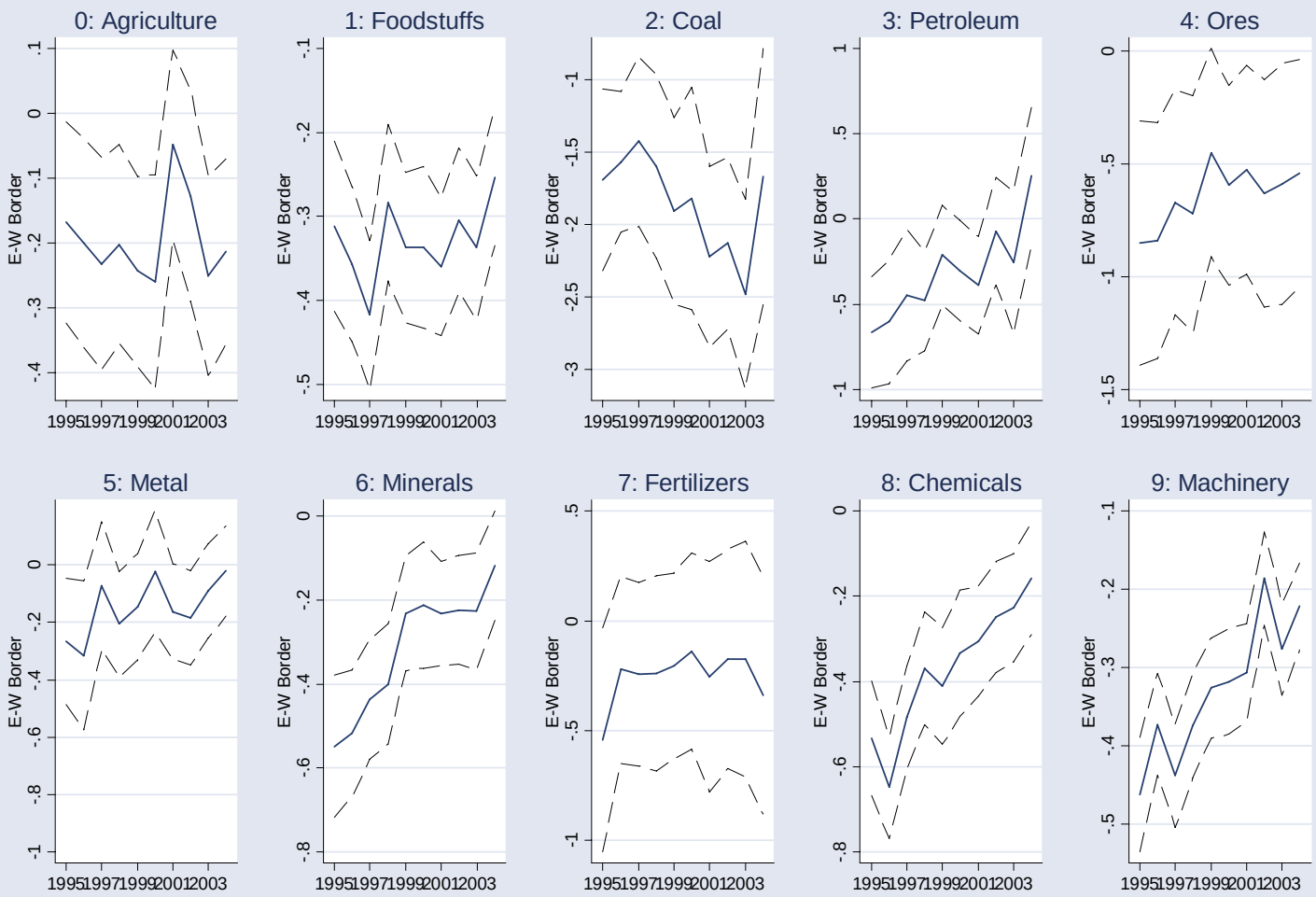
Results VG

E-W Border, 1995	-0.555	(0.070)	-0.557	(0.069)	-0.555	(0.069)
E-W Border, 1996	-0.461	(0.064)	-0.464	(0.063)	-0.460	(0.064)
…						
E-W Border, 2003	-0.381	(0.048)	-0.383	(0.047)	-0.380	(0.048)
E-W Border, 2004	-0.304	(0.046)	-0.306	(0.045)	-0.303	(0.045)
State Border, 1995	-0.469	(0.059)	-0.459	(0.060)	-0.480	(0.058)
State Border, 1996	-0.311	(0.057)	-0.301	(0.058)	-0.324	(0.055)
…						
State Border, 2003	-0.231	(0.061)	-0.220	(0.062)	-0.240	(0.061)
State Border, 2004	-0.235	(0.059)	-0.224	(0.060)	-0.244	(0.058)
Log Air Distance	-1.301	(0.038)				
Log Travel Distance			-1.300	(0.038)		
Log Travel Time					-1.476	(0.045)
R^2	0.90		0.90		0.89	

By Mode of Transportation



By Industry

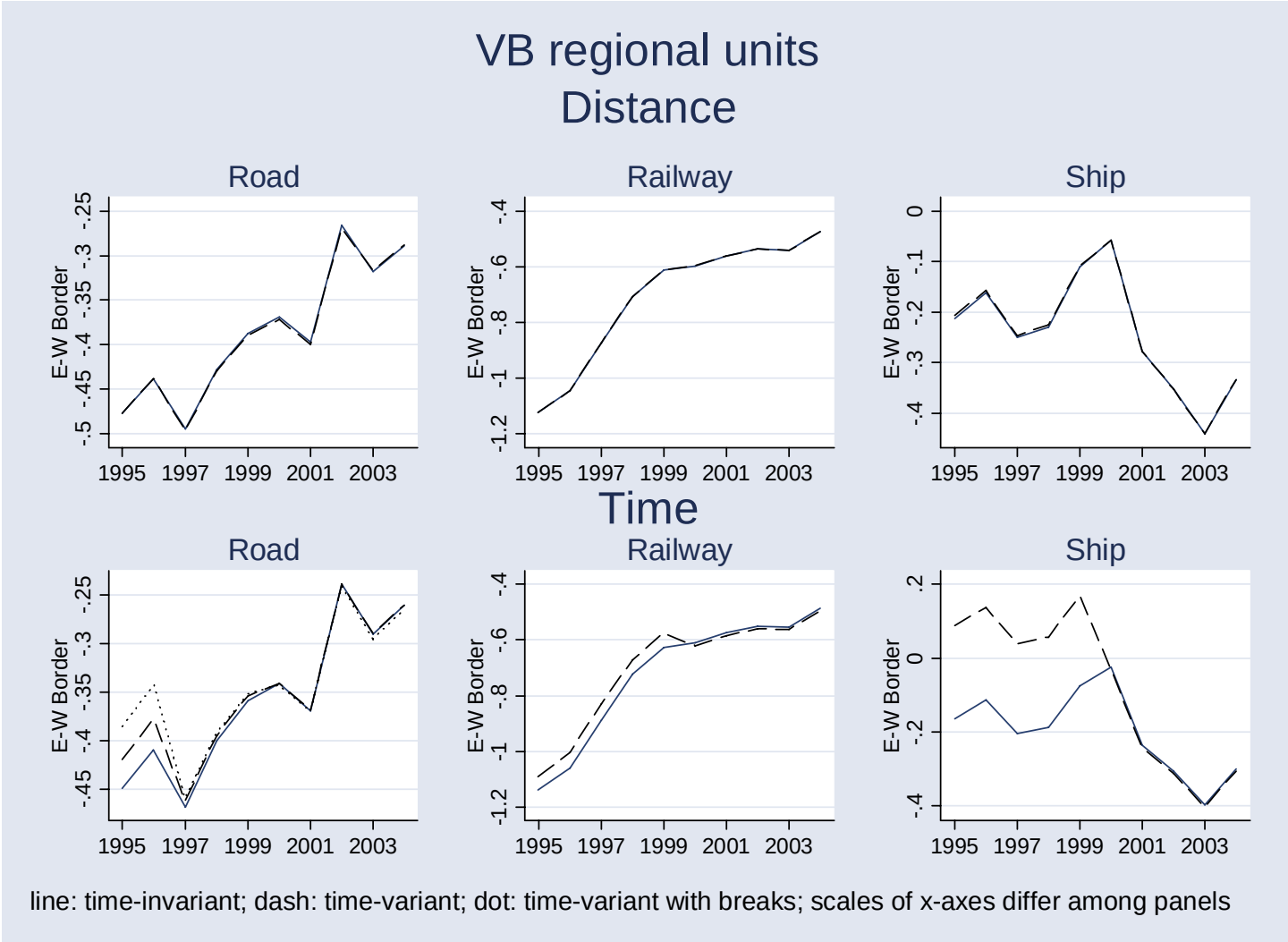


scales of x-axes differ among panels

Explanation 1: Infrastructure?

Mode of Transportation:	**Road**			**Railway**		**Ship**	
Dependent Variable:	**Δ Travel Distance**	**Δ Travel Time**	**Δ Travel Time with Breaks**	**Δ Travel Distance**	**Δ Travel Time**	**Δ Travel Distance**	**Δ Travel Time**
Air Distance	-0.0028** (0.0005)	-0.0081** (0.0014)	-0.0201** (0.0043)	0.0003* (0.0001)	0.0029 (0.0114)	-0.0001 (0.0002)	-0.1976** (0.0073)
E-W Border × Air Distance	-0.0020** (0.0004)	-0.0155** (0.0014)	-0.0553** (0.0100)	-0.0010** (0.0001)	-0.4028** (0.0139)	-0.0107** (0.0004)	-0.3589** (0.0114)
Adj. R^2	0.04	0.11	0.03	0.02	0.29	0.36	0.51

Explanation 1: Infrastructure?



line: time-invariant; dash: time-variant; dot: time-variant with breaks; scales of x-axes differ among panels

Explanation 2: Migration?

	East-East	East-West	West-East	West-West
1991	2.6	5.8	2.1	11.0
1992	2.4	4.6	2.6	10.7
1993	2.6	3.9	2.6	9.8
1994	3.1	3.5	2.8	10.4
1995	3.5	3.5	2.8	10.4
1996	3.9	3.4	2.9	10.1
1997	4.4	3.4	2.8	10.0
1998	4.6	3.7	2.8	10.0
1999	4.5	3.9	2.8	10.1
2000	4.2	4.4	3.1	10.2
2001	4.3	4.9	3.0	10.5
2002	4.3	4.6	3.0	10.3
2003	4.4	4.2	2.9	9.6
2004	4.5	4.0	2.8	9.9

E-W Border, 1995	-0.615	(0.065)	-0.617	(0.065)	-0.630	(0.065)
E-W Border, 1996	-0.514	(0.060)	-0.517	(0.059)	-0.530	(0.059)
E-W Border, 1997	-0.520	(0.055)	-0.523	(0.054)	-0.536	(0.054)
E-W Border, 1998	-0.483	(0.051)	-0.485	(0.051)	-0.498	(0.050)
E-W Border, 1999	-0.436	(0.051)	-0.439	(0.051)	-0.452	(0.050)
E-W Border, 2000	-0.494	(0.048)	-0.497	(0.047)	-0.509	(0.047)
E-W Border, 2001	-0.500	(0.048)	-0.503	(0.047)	-0.515	(0.046)
E-W Border, 2002	-0.356	(0.048)	-0.359	(0.047)	-0.371	(0.046)
E-W Border, 2003	-0.434	(0.048)	-0.436	(0.048)	-0.448	(0.048)
E-W Border, 2004	-0.330	(0.046)	-0.333	(0.045)	-0.345	(0.045)
Log Air Distance	-0.774	(0.118)				
Log Travel Distance			-0.781	(0.118)		
Log Travel Time					-0.866	(0.133)
Log In-Migration	0.174	(0.058)	0.171	(0.059)	0.171	(0.061)
Log Out-Migration	0.179	(0.056)	0.174	(0.057)	0.173	(0.058)
R^2	0.96		0.96		0.96	

Conclusion

- Not H1: clearly more than red-tape
- Not H3: rather no artifact
  - Robust to inclusion of BL-borders
  - Robust to various levels of disaggregation
  - Robust to distance-measurements
  - Plausible dynamics over time
- H2: yes, but what kind of fundamentals?

Conclusion

- Infrastructure?
- Business networks?
- Natural geography?

  – Have we already hit the bottom?
  – Extrapolation: ~2022-2030
  – Wolf (2009) *Was Germany ever united?*: comparable estimate for east-west border across Germany 1933 (in 1990 borders)