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May 2005 (oral) Economic History and International Trade  
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**Dissertation Title:** *“The Zollverein, the formation and impact of a customs union”*

**Committee:**

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**Expected Completion Date:** May 2009

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Ph.D., Economics, Yale University, expected May 2009  
M.Phil., Economics, Yale University, May 2006  
M.A., Economics, Yale University, December 2004  
M.A., Econometrics (with honors), Maastricht University, July 2003

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Sasakawa Graduate Student Research Grant, 2008  
 John F. Enders Fellowship, 2007  
 Exploratory Data & Travel Grant, Economic History Association, 2006  
 Scholar Landesstiftung Baden-Wuerttemberg, 2006  
 Cowles Foundation Fellowship, 2003 - 2007  
 Yale University Doctoral Fellowship, 2003 - 2009

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Macroeconomics & International Economics (Yale School of Management) Spring 2009 (tent.)  
 European Economic History, Fall 2005 and Fall 2007  
 American Economic History, Spring 2007  
 International Trade Theory & Policy, Fall 2006  
 Mathematics for Economists (Maastricht University), Fall 2000 and Spring 2001

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Research Assistant, Professor Joseph Altonji, Yale University (Economics), 2004  
 Research Assistant, Professor Hans Peters, Maastricht University (Economics), 2001–2002

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“Borders, Market access and Urban Growth, the case of Saxon Towns and the Zollverein”, 2008  
 (Job Market Paper)  
 “The Zollverein and the formation of a customs union”, 2008  
 “Capital, Markets, Prices and a customs union, Baden’s entry into the Zollverein”, *in progress*

*Book Review:* “Spinning the Threads of Uneven Development: Gender and Industrialization in Ireland during the Long Eighteenth Century” by Jane Gray, *Journal of Interdisciplinary History*, 37.3 (2007) 448-449

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Economic History Association Annual Meeting, 2008  
 Economic History Association Annual Meeting, 2007 (Poster Session)  
 Harvard University, Economic History Tea, October 2008  
 Rutgers University, Economics Department, January 2007  
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## **Dissertation Abstract**

### **Introduction**

In 1834 independent German States founded a customs union, the *Zollverein*, which became the institutional centerpiece of Germany's economic unification. This union created a common market, harmonized currencies, introduced a modern customs system, and led to the standardization of economic regulations. My dissertation investigates the economic impact of the *Zollverein* as well as how it formed, drawing on a wide variety of source material, ranging from archival data and historical statistical publications to modern Geographical Information Systems (GIS) data. The examination of the *Zollverein* sheds light on recent experiences and developments of customs unions, providing a historical case study for the renewed interest in economic geography and customs union theory in the field of International Trade.

The first chapter examines the growth effects of the changes in market access through the *Zollverein*. The empirical analysis also demonstrates the importance of correct distance measurement through the introduction of a new GIS-based distance measure. The second chapter investigates the impact of the *Zollverein* on regional capital stocks, employment, and market integration. The final chapter provides an analytical narrative of the formation process, explaining the negotiation structure, accession sequence and institutional features of the *Zollverein*.

### **“Borders, Market Access and Urban Growth, the Case of Saxon Towns and the *Zollverein*” (Job market Paper)**

This paper measures the impact of the trade liberalization enacted by the *Zollverein*. Using urban growth as an indicator for economic growth, I show that the removal of trade restrictions had a significant positive effect on the growth of Saxon towns close to the liberalized borders. In addition, I construct and apply a GIS-based economic distance measure, which yields more precise and robust empirical results than more conventional distance measures.

With a recent New Economic Geography model as a theoretical framework (Sturm & Redding, 2008), I utilize a newly-collected data set of town sizes and rural population within Saxony and neighboring regions to empirically establish the link between urban size, market access and location characteristics. Population data are then complemented with an extensive set of geographical and institutional town characteristics. Market access measures and location characteristics are based on the new distance measure, which takes into account historical transportation infrastructure, such as roads, as well as geographical factors, like elevation, using GIS methodology.

Geographic position relative to specific borders is used to identify sets of towns whose market access was affected by Saxony's entry into the *Zollverein*. Utilizing variations in pre-customs union tariff barriers, I estimate a difference-in-difference specification to determine the separate effect of the border liberalizations with fellow customs union members. I also evaluate the effect of the increase in barriers

with Bohemia, a neighboring state that did not join the *Zollverein*. The results show that the liberalization with Thuringia had a strong positive effect on town growth close to the border. Finally, the higher barriers at the Bohemian border are shown to have had a negative but not statistically significant effect on town growth.

I further show that the effects of changes in market access are more pronounced for large towns, document the adjustment path of these effects over time, and identify additional spatial effects of agglomeration. This paper also shows that differential growth patterns are due predominantly to migration, although there is a sustained higher natural increase, the difference between births and deaths, close to the Thuringian border.

The comparison of the results for the new cost distance measure and plain distance show that results are more robust to the introduction of controls, that the model fit is improved and that the identification of trading relationships is more precise. Overall the empirical evidence shows that this customs union had a significant impact on regional growth patterns and suggests that cost-distance measurement, which adjusts for geographic and infrastructural factors, positively influences the precision and robustness of the identification of these patterns.

### **“Markets, Prices, Capital and a customs union, Baden’s entry into the *Zollverein*”**

The second chapter investigates the impact of the *Zollverein* on regional development and economic convergence within Baden, a state that joined the customs union in 1836 and had a long external *Zollverein* border with France and Switzerland. Based on archival sources, especially local treasury records, I create a panel data set of aggregate regional commercial tax revenues, which detail the development of the capital stock, employment and the level of economic activity over time. I investigate the impact of the *Zollverein* on these indicators controlling for the influence of urbanization, human capital and domestic as well as foreign market access, using proxies for these factors created from archival resources and GIS methodology. Additionally, I combine this analysis with a newly created data set on regional grain prices, which is used to investigate how market integration and regional convergence of capital and employment influence each other.

### **“The *Zollverein* and the formation of a customs union”**

The final chapter of the dissertation is an analytical narrative of the institutional formation process of the *Zollverein*. Using a theoretical bargaining framework (Aghion, Antras and Helpman 2007), I demonstrate that the existence and nature of economic externalities lead to a choice of sequential negotiations for access. Moreover, these also determine the observed sequence of accession and explain the institutional form as a customs union.

Prussia, the agenda-setter, bases its decisions about negotiations and institutional details on the existence of coalition externalities, predominantly the impact of trade-related effects of a new coalition on non-participants. These externalities stem from financial revenues, international trade policy and market access, as well as the internal political economy of states. I show how these gave rise to Prussia's choice of a sequence over multilateral negotiations. The accession of each state into the *Zollverein* is explained by demonstrating how the agenda-setter maximized its own utility following an optimal sequence, the order of which was determined by the nature of the externalities. This analysis also illustrates that the institutional form of a customs union was chosen over a free trade agreement, since it resulted in higher administrative savings and the avoidance of smuggling losses. These arguments are based on a combination of qualitative evidence, such as government memoranda about fiscal effects, policy recommendations and negotiation instructions for and by high officials, as well as quantitative data from various sources.

This paper explains the *Zollverein* as the outcome of a structured formation process, and shows how the existence and nature of externalities shaped the institutional structure of German economic unification.