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AICGS POLICY REPORT

PRODUCT STANDARDS IN TRANSATLANTIC TRADE AND INVESTMENT: Domestic and International Practices and Institutions

Tim Büthe
Jan Martin Witte

AMERICAN INSTITUTE FOR CONTEMPORARY GERMAN STUDIES THE JOHNS HOPKINS UNIVERSITY

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FOREWORD

In the increasingly integrated Euroatlantic economy, U.S. and European companies must be able to operate in two, sometimes conflicting political, economic, regulatory, and cultural environments. When the United States and Europe adopt different approaches, for example, to regulation of data privacy on the Internet, corporate governance, or environmental regulations governing disposal of industrial products, companies can be caught in the middle. Such regulatory differences create uncertainties for corporate leaders, inflict adjustment costs on national economies and firms, and at times act as a drag on investment across the Atlantic. The United States and Europe currently are in the process of inventing mechanisms to work out these issues within the broader framework of transatlantic relations. Whether they will be successful in doing so remains to be seen, for reconciliation inevitably entails political and economic costs and trade-offs and may be impeded by resistance at home, structural asymmetries, or deep-rooted cultural attitudes. With over $1 trillion in foreign direct investment between the United States and Europe over the past decade, the stakes in this battle to define the rules of the Euroatlantic economic space are high.

With the generous support of the DaimlerChrysler-Fonds im Stifterverband für die Deutsche Wissenschaft, AICGS in 2003 set out to explore the political, social, and economic causes of several key regulatory disputes and the prospects for reconciliation of transatlantic differences. The Institute has focused initially on three critical areas where U.S. and European approaches often collide, at times to the detriment of foreign direct investment across the Atlantic: product standards, corporate governance, and taxation. Three teams of experts were asked to examine these issues from a U.S. and German/European perspective, examining the distinct approaches adopted by the United States, Germany, and the European Union, where appropriate. In each case, the authors were asked to identify the key national, EU, or international institutions involved in shaping and implementing policy; the philosophical, political, economic and other factors that influence policy; and the implications of our often disparate approaches for transatlantic commercial, financial, and economic relations.

In the first paper of this series, Tim Büthe and Jan Martin Witte examine the intricate workings of international standardization, as it operates in Germany, the United States, and at the global level. They identify the key actors and institutions for setting product standards, analyze cross-national differences, and develop concrete policy recommendations to advance transatlantic cooperation. While Germany is often at an advantage when it comes to international standards, the authors conclude that there are merits to both the German and U.S. standardization systems, each reflecting the different domestic political economy, history, and culture of each country. In order to reconcile differences, the authors recommend that Germany maintain high levels of involvement in international standards setting and raise awareness of the benefits of standards among business leaders. They argue that the United States should acknowledge the important public goods characteristics of standards and should be more aware of and involved in standards setting. Although significant progress has been made in all areas, there is still room for improvement on both sides.

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CATHLEEN FISHER
Deputy Director
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EXECUTIVE SUMMARY

Standards play a crucial—if often overlooked—role in firms and in the economy at large, reducing transaction costs; enabling economies of scale; facilitating quality control; and ensuring employee, consumer, and environmental protection. At the same time, cross-nationally divergent product standards have emerged as one of the most prominent non-tariff barriers to trade over the past twenty years, and political economists and policymakers are also beginning to recognize their importance for foreign direct investment (FDI).

This study examines the setting and harmonization of product standards in the transatlantic marketplace, where standards and standards setting are increasingly becoming a contentious issue between the United States and European countries. This study focuses on standardization in the United States and Germany, as well as the largest international standards developing organizations, ISO and IEC. It examines how standards are set, analyzes the consequences of national differences, and presents a set of policy recommendations.

Standards and Cross-National Differences in Standards Setting

Product standards specify design or performance characteristics of manufactured goods. As such, standards are voluntary, though the use of standards as the basis for regulations may render compliance mandatory. Also, economic and political-legal incentives (such as economies of scale and conformity with best practice to minimize product liability risks) frequently push firms toward conformity with predominant standards even when there is no legal obligation to do so. It is, therefore, of great importance for producers, consumers, and public policymakers which technical specifications are written into a standard, especially when standards are harmonized on the national, regional, or international level, since the distribution of the resulting adjustment costs affects firms' competitiveness in the globalizing economy.

The technical specifications that constitute the core of a product standard are largely a function of how it is set and by whom. For most manufactured goods outside the IT sector, standards are set through institutionalized cooperation among firms and other stakeholders. However, the institutions and actual practice of standards setting vary greatly across countries, both historically and at present. These differences are rooted in different economic, legal, and socio-political traditions. In Germany, industry-wide standards are seen as partly or even primarily public goods, and standardization is highly coordinated and coherent. Most of it takes place

within a single dominant national institution (the DIN), which is strictly non-governmental, market-oriented, and draws largely on private sector expertise, but is also publicly subsidized and regulated (see chapter 2). Standardization in the United States, by contrast, is characterized by fragmentation. There are hundreds of private-sector standards developers (operating with neither public subsidies nor oversight), which produce multiple competing, and often incompatible, standards for many products. Standards are seen primarily as means of achieving a competitive advantage in the marketplace, with non-commercial interests largely on the sidelines (see chapter 3).

International Standardization

The globalization of product markets is leading to a shift of standardization from the national to the international level. Although this internationalization of standards changes the role of domestic standards developing organizations, it does not diminish their importance. It renders their ability to collect and disseminate information and to aggregate frequently diverging technical preferences of national firms into a single position crucially important. Those national standards systems that do, in fact, facilitate comprehensive information management and succeed in building national consensus positions efficiently can take advantage of the consensus decision-making procedures in international standards developing organizations such as ISO and IEC, procedures that are meant to ensure cooperation and compromise. In this context, the institutional fragmentation of U.S. standardization puts U.S. firms and other standards interests at a disadvantage vis-à-vis their German counterparts, who benefit from the DIN's ability to pass on information quickly and efficiently and represent German standards interests effectively at the international level. European regional standardization and the participation of multiple European standardizers in the ISO and IEC, by contrast, appears to play no significant role so far in putting U.S. interests at a disadvantage, though it is regarded with suspicion by American and other non-European firms.

Policy Recommendations

The analysis in this study leads to a set of recommendations for firms, standards developing organizations (SDOs), and public policymakers. These recommendations are designed to:

- Ensure standards of the highest quality that fulfill legitimate public policy needs and enhance the efficient functioning of competitive markets;
- Maintain and increase the satisfaction of all stakeholders, especially as standards setting shifts increasingly to the international level; and
- Facilitate cooperation in transatlantic conflicts of interests over standards issues.

Recommendations for Firms

- Seek and maintain high levels of involvement in institutionalized standards setting;
- Raise awareness of the technological importance and economic benefits of standards among senior business leaders;
- (For U.S. firms only:) Rethink the approach to standards in recognition of their public goods characteristics.

Recommendations for U.S. SDOs and Public Policymakers

- Establish and improve channels of communication for the dissemination of information about standards proposals and standardization work at the international level;
- Limited and targeted public support in recognition of joint public-private interest.

Recommendations for German SDOs and Public Policy

- Continue to increase efficiency to facilitate the participation of firms and non-commercial stakeholders in standardization;
- Prioritize international over regional standardization.

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CHAPTER ONE

PRODUCT STANDARDS AND STANDARDIZATION

TIM BÜTHE

The Importance of Standards

Standards are often viewed as "just technical" norms, but they in fact have eminent economic importance. Standards reduce transaction costs, affect the path of technological development, boost economic growth, and impede trade and investment if they differ cross-nationally, but can facilitate trade and foreign direct investment (FDI) if they are internationally harmonized. They promise benefits for firms, national societies, and the global economy.

Consider, for example, the following findings:[1]

- Standardization of products is a prerequisite for industrial production and facilitates cumulative technological development.
- The overall economic benefits of standardization amount to about 1 percent of GDP–more than €15 billion for Germany alone.
- Cross-nationally divergent standards, acting as non-tariff barriers to trade, result annually in $20 billion to $40 billion in lost sales of goods and services for the United States alone.
- The development of an international product standard for freight containers (specifying uniform dimensions, etc.) has resulted in a spectacular reduction in international long distance shipping times and costs over the past thirty years.
- Cross-national differences in product standards are serious and increasingly important impediments to foreign direct investment (FDI).

Business managers and policymakers on both sides of the Atlantic ignore standards and standards setting processes at their own peril. The harmonization of product characteristics and production, which is an inherent part of standardization, brings benefits but also creates adjustment costs. The technical specifications at the heart of a standard determine the distribution of those costs, resulting in increasing transatlantic conflicts of interest. Moreover, recent research shows that the extent to which countries, companies, and other interested stakeholders can influence the technical content of a standard is largely determined by how standardization is undertaken.[2] An understanding of the process of standards setting is therefore crucial. Finally, standards do not come about automatically (especially standards of the highest technical quality). Since many standards have public goods characteristics, i.e., they lack both depletability and excludability, they are in danger of being undersupplied.[3]

Given the importance of standards and standardization, this study has three objectives: (1) to familiarize policy makers, business leaders, and scholars with the most important uses and characteristics of standards and with the key actors and institutions for setting product standards in Germany and the United States; (2) to analyze the implications of the cross-national differences when standards setting shifts to the international level; and (3) to develop a set of policy recommendations to advance transatlantic cooperation in international standardization.

The study is organized as follows: The remainder of this first chapter provides a brief non-technical introduction to standards and standards setting. Chapters 2 and 3 analyze standardization in Germany and the United States, respectively. Chapter 4 provides an overview of standards setting at the international level. The final chapter provides an analytical conclusion, discusses the implications of the internationalization of standards setting for FDI, and offers some policy recommendations.

What is a Standard?

The International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC), the largest international standards developing organizations, define a standard as "a document … that provides, for common and repeated use, rules, guidelines or characteristics for activities [i.e., processes] or their results [i.e., goods or services]…"[4] The key elements of this definition are: A standard prescribes behavior or characteristics of people or inanimate objects; yet, it does not in itself mandate compliance. Akin to a norm, a standard is an instrument of governance, but it is more explicit than most social norms. At the same time, it differs from a governmental regulation in that the use of, or compliance with, a standard is by definition not mandatory—though standards may well become the technical basis for laws and regulations.

What are Product Standards?

Product standards specify design or performance characteristics of a manufactured good, "such as its size, shape, … functions … or the way it is labeled or packaged before it is put on sale."[5] This study focuses exclusively on product standards since they have by far the greatest impact on international trade and—jointly with accounting standards—on foreign direct investment.

Ways of Setting Standards

Three ideal types of processes for setting standards should be distinguished: (1) market selection (resulting in de facto standards); (2) government imposition (regulatory or public procurement standards); and (3) institutionalized cooperation among firms and other stakeholders. Each of these ways of setting standards has advantages and drawbacks. This study concentrates on institutionalized non-governmental standards setting, because it is for most industries the most important approach to setting product standards. Unlike market processes, institutional structures and procedures of standards developing organizations (SDOs) differ significantly between the United States and Germany.[6]

INSTITUTIONALIZED COOPERATION AMONG PRIVATE ACTORS

Standardization through voluntary, institutionalized cooperation among companies and other private stakeholders overwhelmingly takes place in formal standards developing organizations (SDOs) with a permanent central staff that coordinates the activities of dozens if not hundreds of technically specialized decentralized committees and working groups, which is where the actual development of standards takes place. Most countries have a single dominant national SDO, which is also the country's representative in the preeminent international non-governmental organizations for the development of product standards, ISO and IEC, while some countries and notably the United States have a multitude of private SDOs (see chapter 3 of this study).[7]

Standardization through voluntary institutionalized cooperation has several key advantages over market selection and government imposition. It allows firms to pool their resources in developing standards. Additionally, broad-based participation ensures legitimacy and makes it more likely that the standard will be adopted by the vast majority of market participants. The major disadvantages of this approach are, for firms, that it is fairly time-consuming and requires compromise—and that participating companies have to forego intellectual property rights to the contributions of their employees. For society, much depends upon the institutions and decision-making procedures.

Due to the adoption of consensus procedures and the increased transparency of SDOs, earlier concerns that the secretiveness of institutionalized cooperation

"CONSENSUS" STANDARDS SETTING

Most SDOs follow a "consensus" decision-making norm for developing or updating standards through a multi-stage process. The process begins with the initial determination of the technical scope of the standard and concludes with the adoption and publication of the final version of the technical specifications of the product covered by the standard. According to the consensus norm, the highly specialized technical committees that conduct this standardization work must, at each intermediate stage of the process, achieve consensus to move the standardization process forward. Moreover, at the conclusion of each major stage, the then-current draft of the standard should be offered for public commentary to ensure input from all parties who might be affected; any objections to the draft are supposed to be resolved through consensus at the outset of the next stage (and before publication).[8]

may lead to standards that are detrimental to consumer interests, have largely subsided. However, groups such as consumers, labor, and arguably small businesses are usually underrepresented in SDOs. Moreover, the ability of these groups to take advantage of the provisions for public commentary depends on whether they know about the standardization work underway and can assess the technical details, which are usually presented without explanation of the underlying rationale. In this sense, "consensus" in standards setting may refer to nothing more than "agreement among only those interests presented or consulted."[9] For society, then, this approach does not guarantee socially optimal standards either. Much depends upon the institutional structure of the SDO, especially the decision-making procedures and the composition of the technical committees or sub-committees that are charged with drawing up the technical specifications.[10]

Power and Influence in Standards Setting through Institutionalized Cooperation

Setting standards through the institutionalized processes of standards developing organizations has important implications for the actions and resources required to influence the technical specifications at the core of a standard:

- **Participation:** Standards setting in SDOs is a participatory process. Simply put, you have to play to win. Those who, directly or indirectly, actively take part in the technical work have multiple opportunities to shape the technical details and thus affect the scope and content of the standard. This inherently gives participants a great advantage over those who only comment at public inquiry stages and over those stakeholders that may only ex post become users of the standard;

- **Technical Expertise:** Having a stake in a standard and being willing to participate in its drafting is rarely sufficient to influence its technical details. Those who have access to sufficient technical expertise can have a significant impact on the specifications, whereas those who lack the expertise (or the technology to apply it) can rarely make a difference;

- **Early and Good Information:** Early knowledge of proposals for a new or revised standard is crucial. It allows stakeholders to determine the implications of the (proposed) new standard for their products and production processes and to influence the technical specification accordingly. The first stage of the standardization process, during which the scope of the new standards project is specified, is probably the most decisive step in the overall process. Subsequent negotiations in the working group or technical committee are based on the early document that sets the general direction for the development of the standard. More generally, changes to the technical specification become increasingly difficult along the way since the conclusion of each stage through consensus procedures creates a new status quo. Latecomers to the standardization process will have to challenge an existing consensus among those who have participated during earlier stages;

- **Economic Resources:** Since standardization through institutionalized cooperation is a time-consuming process that involves multiple meetings of the participating technical experts, making one's voice heard from the beginning through the adoption of the final standard requires considerable economic resources. Only those able to pay for travel, accommodation, and the time to participate in the working group and technical committee meetings can have sustained influence.

Conclusion

The economic stakes in the setting of product standards are high, since firms whose products differ from the prevailing standard may have to pay significant adjustment costs to bring their products into compliance with national or international standards. But who sets the standards? How do the standards setting institutions actually operate in the largest economies of Europe and North America, Germany and the United States, and at the international level? The following chapters will address these questions at the national and international level in turn.

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CHAPTER TWO

STANDARDS AND STANDARDIZATION IN GERMANY

JAN MARTIN WITTE

Product Standards and Standardization in Germany

Germany was a latecomer to the industrialization process. While many of its Western European neighbors and the United States had already capitalized on the fruits of the "mechanical revolution," Germany remained politically divided and economically weak. This situation changed in the late nineteenth century, as Bismarck united the country with an iron fist, and Germany entered a period of unprecedented industrial growth. Standardization played a key role in this state-induced transformation process, beginning with the creation of the *Physikalisch-Technische Reichsanstalt* in 1872, which was charged with developing basic scientific and measurement standards, It was part of a broad-based strategy to make German industry internationally competitive and to catapult the German economy into the modern industrial age.[11]

The German standardization system has expanded tremendously since the late nineteenth century. Today, the main German SDO, the non-governmental organization now known as the German Institute for Standardization ("*Deutsches Institut für Normung*" (DIN), formerly the German Standards Committee or *Deutscher Normenausschuss*, (DNA)), maintains 78 standards committees, administers more than 28,000 standards and coordinates relations with a wide range of regional and international standardization organizations. Despite a fundamental change in political regime with the breakdown of the Third Reich after World War II, and the increasing sophistication and complexity of technical standardization, there has been an astonishing degree of continuity in the main features and operating principles of German standardization since the DNA's inception in 1917. Specifically:

- **Coordination:** Standardization in Germany is highly coordinated. While there are more than 140 other organizations that are somehow engaged in the development of standards in Germany, the sole authoritative source of German standards is DIN, which also represents German interests at the regional and international level;[12]
- **Coherence:** The German standardization system does not allow contradictory standards to be in place. Whenever DIN issues a new product standard (or introduces a European or international standard into the German system), all other potentially competing standards are withdrawn;
- **De Facto Legal Significance:** German companies are neither obligated to participate in standards development, nor are they required to adopt DIN standards. Yet, in many cases, DIN standards are referenced in German legislation and regulations. While DIN standards as such are not legally binding, DIN standards enjoy a special recognition in German courts;[13]
- **Balance of Interests:** DIN standards support the public interest. In discussions of German economic policy, a "healthy" standards infrastructure is one

> that serves the public interest in meeting multiple objectives: To foster growth in the economy; to strengthen the competitiveness of domestic firms internationally; to assist the state in regulating the economy; and to protect the health and safety of consumers. DIN is obligated by treaty with the German government to take into account the broader public interest in its standardization activities, and to make sure that standardization work proceeds according to established due process principles laid down in DIN 820. The German government, in turn, execises legal oversight and provides substantial financial support for DIN.[14]

The German standardization system is thus multifaceted, fusing public, private, and not-for-profit elements in its organizational setup and actual work procedures. Although the current, hybrid system has deep historical roots, it is also increasingly linked to an emerging regional standardization system within the European Union. The remainder of this chapter describes and analyzes the German standardization system—its historical roots, basic norms and principles, current institutional structure, and relationship to regional standardization in the European Union.

The German Standardization System

The German standardization system has expanded considerably since its nascent days at the end of the First World War. In spite of enormous political and economic changes, however, the principal structure and basic operating features of that system have proven to be quite robust.

POLITICAL-ECONOMIC CONTEXT

The broader political economic context within which the German standardization system emerged in the early twentieth century was characterized by three distinctive elements: (1) the existence of a capable and strong state that directed and dominated the German industrialization process; (2) a predilection for close coordination between government and private industry, which later developed into the distinctive German model of "coordinated capitalism"; and (3) a legal, political and institutional environment that enabled close collaboration among firms and coordination through non-market mechanisms.[15]

The organizational foundations of the German standardization system were laid at the end of World War I. Before 1914, industry-level standardization was largely unknown in Germany. The rapidly increasing demands of the war put the German state and military leadership under tremendous pressure to increase output and to improve the efficiency of wartime production. A concerted approach toward standardization was seen as a crucial element of the overall strategy to boost output. While WWI provided the necessary impetus for the emergence of industry-level standardization in Germany, the leading role of the state in driving economic development as well as the importance of associations and the tradition of "industrial self-administration" (*Selbstverwaltung der Wirtschaft*) provided the political-economic framework within which the new German standardization infrastructure emerged. The result was the development of a highly centralized and formally independent institutional setting for product standardization, driven by private industry, yet obligated to take into account the broader public interest and strongly supported by government to achieve its objectives. It is important to note in this context that German business repeatedly defended private control over product standardization in response to various attempts by the government to play a more direct and interventionist role.[16]

While many of the principal organizing features of the pre-World War I German political economy have relevance to this day, there are important differences between the political economy of Imperial Germany and the Federal Republic, in particular with regard to the role of the state in the economy.[17]

The post-World War II German political economy has often been characterized as a form of "organized capitalism," a "Middle Way," or simply as "Model Germany." Most observers identify five key features of "*Modell Deutschland*": (1) A universal banking system that provides German firms with access to long-term finance; (2) a highly organized and coordinated labor movement that facilitates effective collective bargaining with equally well organized and coordinated employer associations; (3) an extensive welfare state; (4) powerful national industry associations that facilitate constructive dialogue and "partnership" with the state; and (5) so-called "parapublic" institutions

that provide independent governance functions "at the behest of or under the general supervision of the state."[18]

While all elements of this cohesive political-economic system are important, an appreciation of the central role of "parapublic institutions" in structuring the political economy is crucial to an understanding of product standardization in Germany. Instead of intervening directly in the economy, the German state nurtures a wide range of supporting institutions that assume governance functions, which in other countries may be provided by the government. The government supervises these institutions and intervenes only if the "basic rules of the game" are violated. Such supporting institutions are pervasive in the German political economy and take very diverse forms. They include, for example, the innumerable factory councils that are part of the statutory system of workers' representation at the firm level.

Such "parapublic institutions" bridge the gap between the public and the private sector and act as "political shock absorbers,"[19] making public administration and policy implementation less controversial and more technically informed, since they limit the direct influence of the government. The existence of "parapublic institutions" also influences Germany's regulatory culture: Formalized cooperation (rather than pervasive conflict) between business and government is the norm.

DIN AS A "PARAPUBLIC" INSTITUTION

DIN is a crucial "parapublic institution" in the area of product standardization. DIN is established as a private association under German law (*eingetragener Verein*), but is not a non-profit-organization in the traditional sense. DIN has always enjoyed a very close working relationship with the German government, and the government, in turn, has extensively referenced DIN's work in laws and regulations. The government in many ways depends on DIN's work, since the ministerial bureaucracy lacks the relevant expertise to deal with the complex issues of technology governance. The close relationship between the government and DIN was codified in a treaty between the two parties, signed in 1975.[20]

This treaty has not turned DIN into a part of the state's administrative system, neither directly nor indirectly. In addition, DIN standards as such do not have a binding character and are not treated as such by German courts. However, the German legal system accords special recognition to private organizations, such as DIN, that provide services widely considered important for the general public. In German legal jargon this status is called *"besonders anerkannter Beliehener."*[21] Also, the government's special recognition has turned DIN into the sole authoritative source for German product standards. As a result, DIN is virtually guaranteed steady financial support from the government. In turn, by virtue of the 1975 treaty, DIN acknowledges that there is a legitimate governmental interest in safeguarding the due process principles of its standardization work. The government exercises legal oversight to ensure compliance; this oversight does not interfere, however, with DIN's managerial control over its various standardization activities.[22]

In sum, therefore, DIN can be considered part of the plethora of "parapublic" institutions in Germany. De jure, DIN is a private association. De facto, it fulfills an indispensable public role, in close interaction with and regulated by the government. The fact that DIN is not a publicly incorporated organization does not detract from this function.

DIN MEMBERSHIP

DIN is a membership-based organization. While membership is not a prerequisite for participation in DIN's technical work, the membership structure provides a good approximation of the overall engagement of stakeholders—public and private—in German standardization. Currently, the organization has 1,682 members.[23] The overwhelming number of members come from the corporate sector, and here in particular from medium-sized and large firms. More than two thirds of DIN's total membership base comprises companies with more than 100 employees. More than a third of its membership comes from companies that have more than 500 employees. The thirty-two "Other Members" listed in Table 2.1 are comprised of twenty-three universities, two federal ministries, and seven associations.

While firms with 100 to 500 employees form DIN's single largest constituency, DIN's board as well as the staffing of individual technical committees is dominated by representatives from large German corporations. In general, small companies probably do not have adequate resources to bankroll their effective participation. Some observers argue that this puts small and medium-sized enterprises, like consumer interests, at a disadvantage in German product standardization. While DIN has instituted various mechanisms and principles to encourage the participation of small business and consumer interests in its standardization work, it seems reasonable to expect that an organization whose financial viability depends to a large extent on member contributions has to cater to large stakeholders at the expense of smaller players.[24]

GOVERNANCE STRUCTURE OF DIN

The most salient features of DIN's governing structure are the member convention, the president, the director, and the standards committees (each standards committee maintains a variable number of working groups).

Membership Convention: Even though it is the most important governing body of DIN, the member convention plays only a small operational role. A membership convention is held every two years and elects the presidium of DIN, which effectively controls the organization. The presidium elects the president, appoints the director, and decides on the creation or dissolution of standards committees. Interestingly, it is also the presidium, not the member convention, that votes on changes to DIN's charter.[25]

Decentralized Standards Committees: The actual standardization work is done in standards committees and working groups and therefore is outside DIN's immediate organizational center. This does not mean that DIN does not have any impact on the actual shape of a particular standard. DIN sets the basic rules for work proceedings in these committees. And, as noted above, DIN's presidium also decides which standards committees are created and which are dissolved. However, DIN itself has fairly little operational influence on how standards development proceeds in the committees. Instead, company experts delegated by their firms to DIN standards committees drive the work process.

DIN FINANCING

For its core standardization activities, DIN employed 452 people in 2002 (down from 562 in 1997, largely due to rationalization). DIN also maintains an infrastructure for standards development, pays membership fees to regional and international standardization organizations, and incurs other standardization-related expenses. Funding for DIN's activities comes from three sources: Income from DIN's subsidiary companies; membership dues and contributions; and government contributions. DIN's standardization budget in 2002 totaled €66 million, down from 87 million in 2000. In 2002, 13 percent of the budget was financed by government contributions. The government provides only financial assistance for projects. It does not award institutional grants. The government subsidizes DIN's membership contributions to the European and international standardization organizations, however, as well as third country assistance programs carried out by DIN.[26] The share of government contributions to the overall budget has stagnated over the past decade. Yet, it is still fairly substantial, and reflects the state's interest and stake in product standardization.

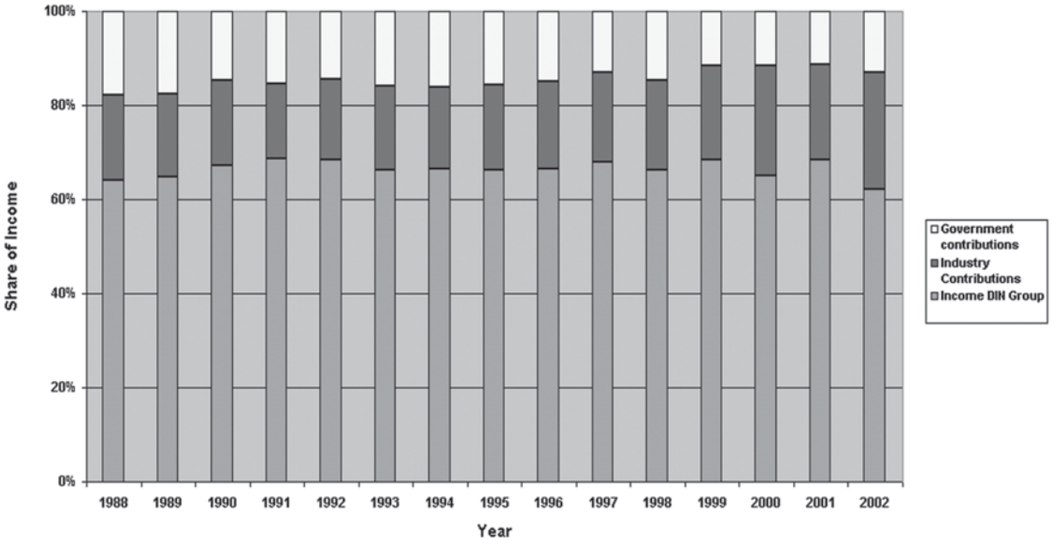
Table 2.1 Structure of Membership by Firm Size

Number of Employees	Below 100	Between 100 and 500	Above 500	Other Members	Total
Number of Members	397	679	571	35	1679

Source: Data provided by DIN (July 28, 2003)

Figure 2.1

DIN INCOME BY SOURCE, 1988-2001



Until the early 1970s, a very substantial part of DIN's budget was financed by the sale of standards publications. Revenue from these sales has dropped significantly, however, primarily because copy machines have become standard office equipment. Since neither the government nor the private sector wanted to pick up a larger share of the bill, DIN had to create alternative sources of income. Today, the largest share of DIN's budget is financed by the profits generated from the operation of DIN's commercial subsidiaries (DIN ITS GmbH, DIN CERTCO, Beuth Verlag and DIN Software GmbH) and DIN's shareholdings (DIN Gost, DQS GmbH, DIN bauportal GmbH). In 2002, income from these sources financed 62 percent of DIN's standardization budget.

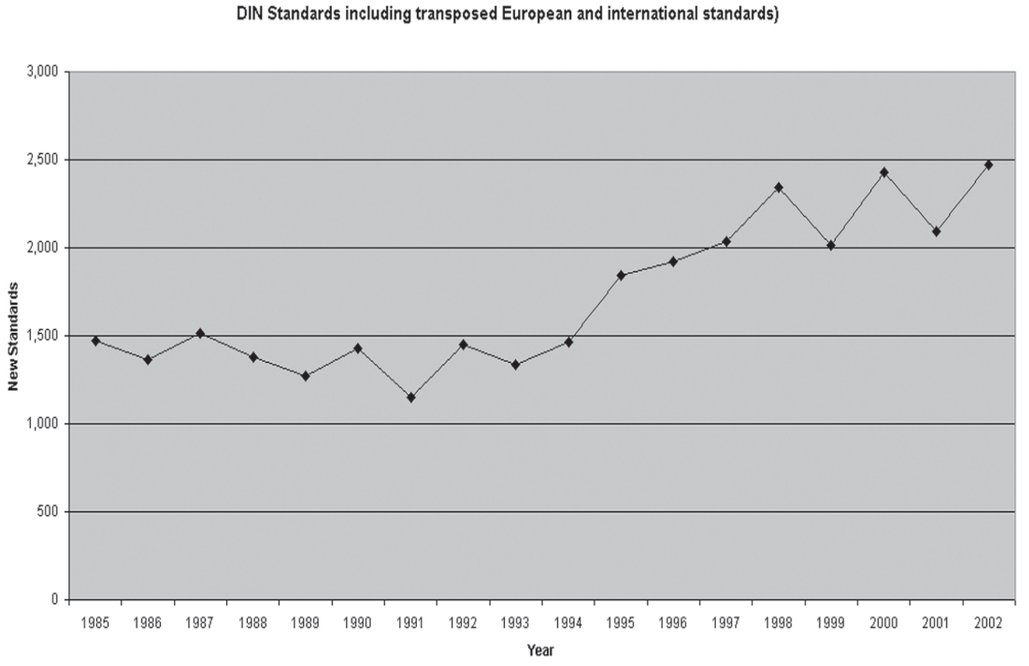
The remaining portion of DIN's budget comes from member contributions. Individual membership contributions are calculated according to the number of individuals a company or organization has employed in the previous fiscal year. As a result, large companies finance a substantially larger fraction of DIN's operating budget than small and medium-sized companies.

DIN STANDARDIZATION PROCESS

DIN's actual standardization work is organized in 78 standards committees and roughly 3,700 working groups. As Figure 2.2 demonstrates, the number of newly published standards has fluctuated quite a bit over the past six years. Overall, however, the number of newly published standards has steadily increased over the past two decades. The significant increase in standards published since 1994 is the result of European harmonization efforts as well as increasing demands for standards in the ICT arena.[27]

More than 25,000 experts—mostly engineers delegated from DIN's members—regularly participate in DIN committee work. Each committee maintains a number of specialized working groups. DIN staff manages the standards committees and is responsible for overall coordination and administration of the process.[28] The finance committee of DIN decides on the funding arrangements for a standards committee. Usually, the financing structure of a standards committee is mixed, combining contributions from DIN's core institutional budget and voluntary contributions of stakeholders represented on the committee.[29] The actual standardization process progresses through five stages, as described in the

Figure 2.2



introduction to this report. This process is designed to give all stakeholders the opportunity to provide input and to criticize drafts. The process also features a number of publication requirements at various development stages to make sure the wider public is informed about new standards projects.[30]

As in institutionalized cooperative standards setting in general (see chapter 1), stakeholders must have technical expertise, access to early and precise information, and sufficient economic resources in order to have an impact on standards development in the consensus-based standardization process used by DIN. On average, it takes three years for a DIN standard to be developed. The number of meetings of committees or working groups during this period varies a great deal across standards projects. Only those firms and organizations able to send well-informed experts to DIN working group and committee meetings–paying for travel, accommodation, and lost work time–will have a significant effect on the resulting standard.

German Standardization in a European Context

Understanding the wider European context is crucial for a thorough grasp of the contemporary German standardization infrastructure. As shown in Figure 2.3 below, the overwhelming majority of new standards issued by DIN are either European or international in origin.[31]

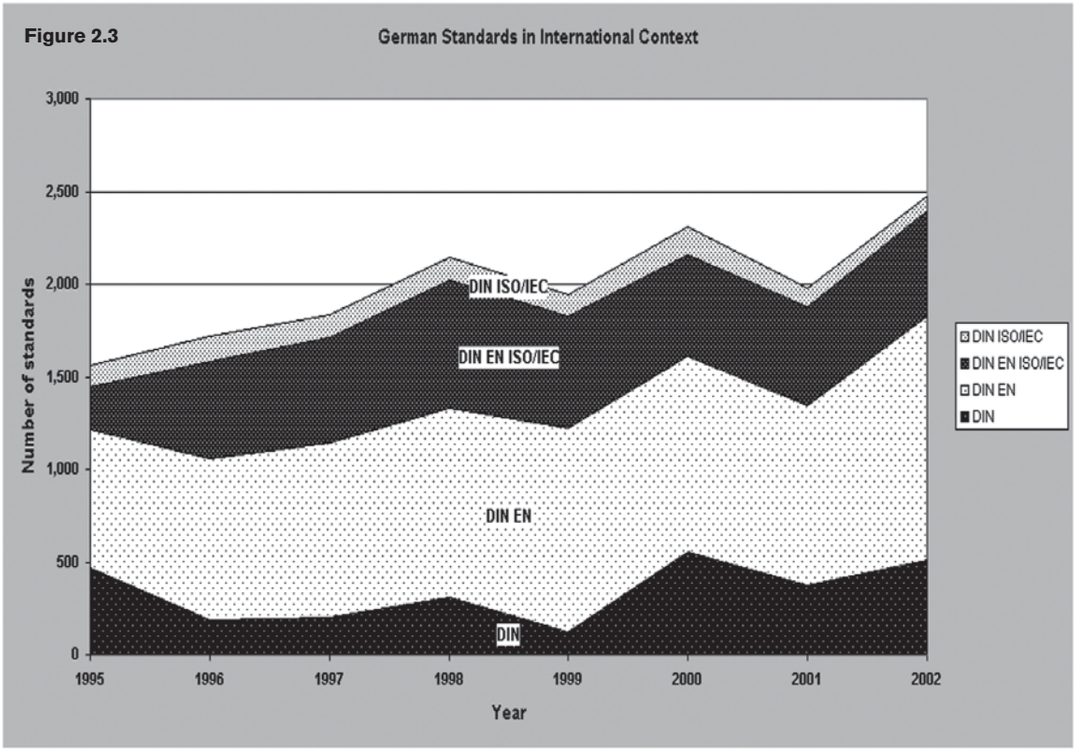
For example, the total number of standards produced by DIN in 2002 was 2,478. Only 519 of those standards (about 20 percent) were purely national (DIN). More than half of all standards (1,311) published by DIN were developed via the European track (DIN EN), and then adopted by DIN. More interestingly, 572 standards were developed in the international framework (ISO or IEC), and then adopted at the European as well as national level. In other words, more than 20 percent of all German standards issued by DIN in 2002 were fully identical with European as well as international standards.

Ever since the conclusion of the Rome treaties in 1957, product standards have figured prominently in policy initiatives designed to deepen and expand the European marketplace. Early on, the European Commission (E.C.) recognized that a single European market would only become a reality once a coherent and effective European standardization infrastructure was in place. In seeking to accomplish this ambitious goal, Europeans faced two principle challenges, however. First, the existing stock of product standards in the EU's member countries had to be harmonized as much as possible in order to facilitate the free flow of goods, services, people and capital. Second, the various national standardization activities had to be coordinated on the European level in order to avoid future divergences. It took the Europeans more than three decades to successfully address both issues.[32]

Between 1970 and 1985, Europeans tried to harmonize conflicting national standards by developing harmonization directives that contained detailed technical specifications (now dubbed the "Old Approach"). As a result, negotiations on harmonization directives in extreme cases could drag on for ten to fifteen years or more before states could agree on a harmonized European standard. Harmonization became a synonym for European inefficiency and obsession with regulating Europe from the top down.[33]

Under the "New Approach" introduced in conjunction with the creation of the single European market, the European Commission continues to develop harmonization directives that–once accepted by the European Council–have to be transposed into national law by all member states. However, these directives do not contain detailed technical specifications. Instead, they spell out "essential requirements" applicable to large product areas, such as toys or pressure vessels. As a result, harmonization directives have become much slimmer and therefore easier to negotiate among EU member states. Decision-making was also eased by the introduction of qualified majority voting in the European Council.[34]

Figure 2.3 German Standards in International Context



Under this new harmonization regime, work on detailed European product standards is delegated to recognized European standardization bodies—the Comité Européen de Normalisation (CEN) and the Comité Européen de Normalisation Eléctronique. These organizations develop European product standards based on the "essential requirements" defined in the harmonization directives. National standardization bodies (the principal members of CEN and CENELEC), such as DIN, are obligated to transpose these European standards into national standards.[35]

The most distinct feature of European standardization is the direct legal link between the directives issued by the EU and the standards produced by CEN and CENELEC. Products that meet the essential technical standards outlined by CEN and CENELEC are presumed to conform to the requirements of the harmonization directives and allowed to circulate freely in the EU. As a result, even though voluntary in nature, European product standardization is an elegant extension of mandatory regulation, providing firms with great incentives to participate in the standardization process to shape their regulatory environment.

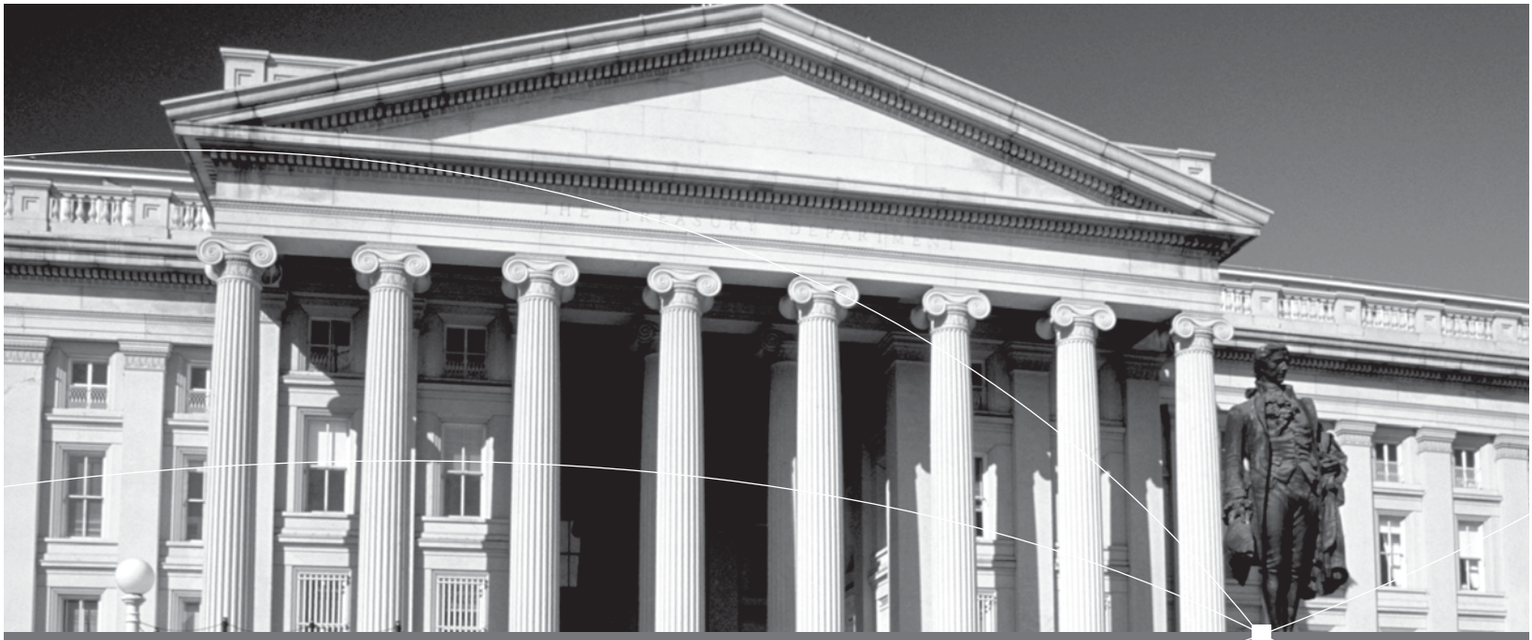
Since the effectiveness of the EU's approach depends to a large extent on the quality of standards developed by CEN and CENELEC, the European Commission is understandably concerned with issues related to technical content, democratic legitimacy, and the degree of acceptance of European standards in the marketplace. As a result, European standards have to be developed according to the specific mandate spelled out in a "New Approach" directive. The standardization process has to be based on the guiding principles for cooperation between the Commission and the European standardization bodies.[36]

It is important to recognize, however, that European standardization efforts are not restricted to activities under the "New Approach." In fact, the majority of work items currently active in CEN and CENELEC do not fall under this category. At the end of 2001, only 13 percent of CEN and 17 percent of CENELEC work items were mandated and financed by the EU.[37] CEN and CENELEC both currently have twenty members (EU plus EFTA states and the Czech Republic and Malta). As the EU enlarges, so will the European standardization organizations. CEN was created in 1961 by national standardization bodies and moved to Brussels in 1975. In 2001, the organization had a budget of roughly €10 million. 46 percent of CEN's budget was financed by membership contributions, 41 percent came from the European Commission, with the remainder coming from sales, contracts and EFTA payments. At the end of 2001, CEN had produced approximately 7,500 standards and maintained 276 technical committees. It is anticipated that CEN will eventually administer roughly 25,000 European standards.[38]

CENELEC, established in 1973, is the result of a merger between several standardization bodies. CENELEC generates standards for electrotechnical products. It currently maintains 78 technical committees. The organization produced 476 new standards in 2001, 65 percent of which are identical to IEC standards. At the end of 2001, the overall CENELEC standards collection contained 4,543 standards, of which approximately 25.5 percent are exclusively European standards. Its budget of €3.6 million in 2002 was financed for the most part through membership contributions (71 percent). Both CEN and CENELEC are officially recognized by the European Commission as the competent standards-making bodies in the EU. The relatively small budgets of both organizations are deceiving, of course, since standardization work is organized in technical committees hosted by the national member bodies and staffed by delegated experts from industry and other interested stakeholders.

The relationship between DIN and CEN/CENELEC is complex and cannot be reviewed in great detail here. Both CEN and CENELEC were created by national standardization bodies that continue to control the organizations through their representation on these organizations' governing boards. However, over the years, both CEN and CENELEC have also developed a considerable degree of independence from their national masters, primarily because of the generous funding provided by the European Commission. As a result, there is a significant level of competition between the regional and national standardization bodies, for example, in the context of formulating European standardization policy for the ISO and the IEC, as well as with regard to the administration of third country assistance programs. For American observers who tend to look at Europe as a coherent—perhaps even monolithic—player in international standardization, this competition may come as a surprise.[39]

In conclusion, European standardization is becoming ever more important for DIN. This trend does not mean, however, that DIN will become insignificant. First, certain standards will continue to be developed for national use only. More importantly, however, national standardization bodies will not be merged into the European infrastructure. In essence, national bodies constitute the institutional backbone of European standardization. National organizations will remain responsible, for example, for the development of a national position on the relevant work items in so-called national "mirror committees." They also nominate the national representatives for the European standards committees and verify that national delegates represent national, rather than parochial, interests.



03

CHAPTER THREE

Standards are one of those issues which are generally taken for granted until something goes wrong, like when Baltimore burned to the ground early in the [20th] century because there were no uniform thread standards for fire hydrants. Congressman Jim Barcia, June 2001.[40]

PRODUCT STANDARDS AND STANDARDIZATION IN THE UNITED STATES

TIM BÜTHE

Product Standards and Standardization in the United States

An early industrializer, the United States was, nonetheless, a relative latecomer in the realm of standardization, with many inconsistencies even in basic measures persisting well into the twentieth century. The recognition, around the turn of the century, that the lack of standards was putting the United States at a disadvantage in the new science-driven industries vis-à-vis several European countries, motivated the development of both public and private institutions that would systematically develop and update technical standards.

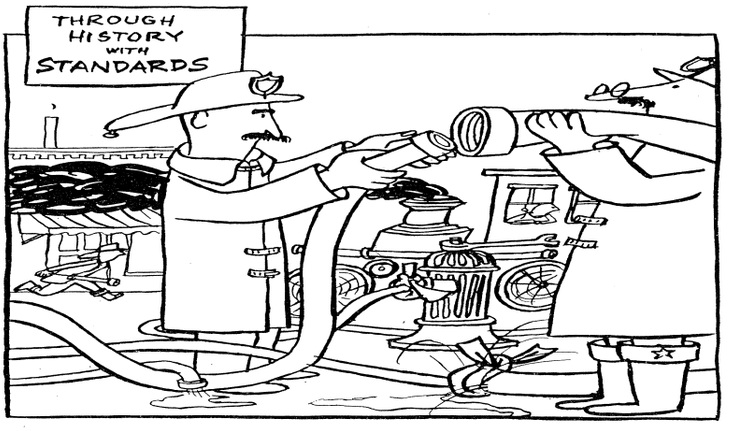
The practices and institutions of standardization in Germany were particularly important examples for U.S. industry and policymakers. The German state's *Physikalisch-Technische Reichsanstalt* in Berlin served as the model for the U.S. National Bureau of Standards, established by Congress in 1901, and the institutionalized cooperation in the development of standards among German engineers and scientists from private sector firms was closely studied by U.S. industry.[41]

Despite initially emulating German practices and institutions, however, U.S. standardization developed in the course of the twentieth century along a very different trajectory, shaped by the particular philosophical traditions and the political-economic context of the United States. As a consequence, the nature and role of product standards in the national economy as well as the organizational structure of product standardization in the U.S. are today fundamentally different from those in Germany. The key characteristics of the U.S. system of product standardization are:

- **Fragmentation:** Several large standards developing organizations (SDOs), which produce standards for a broad range of products, exist alongside hundreds of smaller and often highly specialized SDOs. These multiple SDOs offer multiple competing standards for many products. In addition, many goods are produced entirely to firm-specific standards or standards developed by exclusive groups of firms in consortia. Although standardizers differ in size and economic importance, there is no institutionalized hierarchy among them;

- **Competition & Market:** The more than six hundred private U.S. SDOs, while legally mostly not-for-profit organizations, often compete fiercely for market share for their proprietary standards and have so far rejected most attempts to coordinate their activities more closely under the umbrella of a public or private agency;

Figure 3.1



- **Commercial vs. Public Interests:** The vast majority of U.S. SDOs is adamantly non-governmental, although the federal government, especially the Department of Defense, is also an important source of U.S. product standards. The private U.S.-based SDOs receive no regular public subsidies and are not subject to public oversight. The willingness and ability to pay for one's participation in standards setting is presented as the true and appropriate test of having a legitimate stake in the technical specifications.

THE POLITICAL-ECONOMIC, LEGAL AND PHILOSOPHICAL CONTEXT FOR STANDARDIZATION

The approach of U.S. firms and the federal government to the setting of product standards reflects American economic and political development and is embedded in philosophical and legal tradition as well as U.S. business culture. In particular, the fluctuating willingness of politicians to accommodate industry and commercial interests, the U.S. regulatory tradition, anti-trust law, the institutionalized preference for pure market solutions, the U.S. business community's traditional anti-statism, and the federal political system have shaped the American approach to standardization.

Especially in Europe, it is often believed that the political power of U.S. business is such that American politicians are uniquely attuned and responsive to the needs and demands of businessmen and firms, that the level of regulation is low, and that business for the most part gets to write U.S. regulations. There is some truth to this. For some aspects of the economy, the United States indeed relies to a greater extent on industry self-regulation than most other OECD countries, and Congress requires most regulatory agencies to show through cost-benefit analyses that a proposed regulation is not unduly burdensome for business. In addition, there are some (in)famous cases of firms literally writing regulations or regulatory agencies being "captured" by the industries that they are supposed to regulate. Since the 1960s, however, U.S. regulation has become much more extensive and un-accommodating to industry, in part because of growing concern about public safety and environmental protection—often against considerable resistance from industry. Moreover, the political influence of U.S. business has risen and declined multiple times over recent decades. The amount of organized business lobbying of Congress and the executive has increased greatly over the past two decades, with real effects in some policy areas, but the U.S. business community rarely speaks with a single voice and often fails to get what it explicitly wants. The level and stringency of regulation remains, on the whole, quite

high, and the relationship between U.S. government agencies and industry in the regulatory realm is often antagonistic. U.S. industry therefore has reason to prefer standards setting through voluntary participation in non-governmental institutions over standards setting by regulatory agencies.[42]

The U.S. system of standardization is also shaped by American legal traditions, especially the anti-trust tradition, which is deeply ingrained in U.S. legal doctrine and affects standards setting in two ways. First, the U.S. anti-trust tradition creates a strong, quasi-intuitive inclination among the general public, state prosecutors, government regulators, and excluded competitors to see cooperation among firms as a form of collusion, to the detriment of consumers and the operation of competitive markets. Second, the severe legal penalties for engaging in prohibited forms of cooperation make it more risky for senior managers to support the participation of their firms in institutionalized, private-sector standards setting.[43]

Government authorization and oversight of private sector standards setting might alleviate some legal risks for firms, but would conflict with a strong cultural preference for arms-length, "pure market" economic relations and "anti-statist" opposition among U.S. business to government intervention in the economy. Contrary to the carefully cultivated myth, the federal government actually played a central and quite interventionist role in the economic and industrial development of the United States. Well beyond creating

TABLE 3.1
CATEGORIES OF U.S. STANDARDS DEVELOPERS

Standardizer	*Nature*	*Purpose**	*Participants*	*Primary Source of Funding*	*Notes & Examples*
1. United States federal government	public	Regulation: public Procurement: mostly private	primarily government scientists, engineers, and policy makers; openness to other stakeholders differs greatly by agency	Congressional budget allocation	Dep't of Defense, GSA, FAA, FDA, EPA, OSHA
2.1 general membership SDOs	mostly private	mostly public	open to all stakeholders on a membership-fee basis	sale of standards (documents)	ASTM, NFPA, U.S. Pharmacopoeia*
2.2 trade/industry associations	private	largely public	open to firms (and sometimes non-commercial entities) which are members of the particular association; individuals participate as representatives of firms	membership dues; secondarily: sale of standards	AIA, AAR, API
2.3 professional societies	mostly private	largely public	open to all individuals who, as trained specialists or practitioners, are members of the particular professional society	sale of standards	ASME, SAE, IEEE, ACGIH
3. consortia	private	private	exclusively the delegated technical experts of the participating firms	participation fee	predominantly in the IT sector

* indicates discussion/elaboration in the text.

the political and legal framework for business activity, the American state engaged in the political creation of markets through assigning property rights to vast parts of the West, created (conducive conditions for the development of) monopolies for the railroads, and for many decades provided tariff protection to domestic industries. Yet, the U.S. government rarely interfered directly in managerial decision-making, except to restrict, after 1890, the close cooperation between ostensibly competing firms (and to restrict the organization of labor). In peacetime, it made only limited attempts to encourage investments in particular industries and only minimally institutionalized its relationship(s) to American firms. American businesses thrived—not necessarily because but under these conditions. A forcefully articulated belief in the superiority of free markets and an "anti-statist" norm (advocating a minimal role for the state in the economy), consistent with a truncated but widespread notion of "liberal" political philosophy, allowed the U.S. business community to "accept" the benefits of the above policies, while discounting the role of the government in corporate and economic successes. This tradition finds expression in—and is, in turn, strengthened by—the prevailing structure of the market in the United States. Except for vertical integration of economic activities within a firm, U.S. economic actors rely predominantly on arms-length, pure market relationships "in the context of competition and formal contracting" to solve coordination problems in industrial and employee relations, vocational training, corporate governance, and inter-firm relations. This institutionalized "general suspicion of the state and preference for market solutions" extends to the institutional structure and practice of standardization in the United States today.[44]

The final pertinent aspect of the political and cultural context is the U.S. political system, with significant variation at the state level, including differences in the content and enforcement of regulations and in the treatment of compliance with standards in legal disputes. An analysis of these state-level differences is beyond the scope of this study, which must focus on the predominant federal (U.S.) level. Yet, foreign direct investors should be aware that such differences exist, complicating an assessment of the political and legal context for a specific investment, but also offering additional opportunities.

Key Institutions of U.S. Standardization: Standards Developers

Some seven hundred standards developers operate in the United States today, most of them strictly independently of each other. As summarized in Table 3.1, these standard developers can be grouped into three main categories: (1) government departments and agencies; (2) open, non-governmental standards developing organizations (SDOs); and (3) consortia of firms. Among open, non-governmental SDOs, there are three main types: general membership SDOs, trade/industry associations, and professional/scientific societies.

GOVERNMENT DEPARTMENTS AND AGENCIES

The U.S. Government develops standards mainly for two purposes: procurement and regulation. Government standards are usually developed within agencies, although input from industry and other outside stakeholders may be sought in the process of developing them. Key governmental standards developers are the Department of Defense (DoD), the U.S. General Services Administration (GSA), the Federal Aviation Administration (FAA), the Food and Drug Administration (FDA), the Environmental Protection Agency (EPA), and the Occupational Safety and Health Administration (OSHA).

OPEN NON-GOVERNMENTAL SDOS

There are three major types of open non-governmental SDOs: general membership SDOs, trade/industry associations, and professional/scientific societies.[45] These SDOs are "open" in that participation in their standards development processes is open to all individuals, firms, and non-commercial entities that qualify as stakeholders, as firms engaged in the sector, or as members of a given profession, respectively.[46]

The three types of open non-governmental SDOs in the United States have several characteristics in common. All of them view themselves as strictly private-sector organizations, with government involvement limited to the participation of individual government employees as regular, dues-paying participants. All participants are volunteers in the

sense that they are not paid by the SDO for their technical expertise and their contribution to the development of a given standard, which becomes the intellectual property of the organization rather than the participating individuals or their employers. Furthermore, there are—unlike in most European countries including Germany—no subsidies for the participation of representatives from consumer and other non-commercial groups, consistent with the belief that willingness to pay the membership fees and participate in the technical standardization work without remuneration is the best indication of genuine stakeholder status. Non-governmental U.S. SDOs also receive no public funding and are not subject to regulation or public oversight. Yet, their purpose in developing standards is at least partly public: Rather than developing standards for the proprietary use of the participants, only, they welcome and often seek the adoption of their standards by the broadest possible range of firms, scientific research institutes, and government agencies, regardless of participation in the standards' development.

General Membership SDOs

General membership SDOs are the most broad-based U.S. SDOs, both in terms of inputs and outputs. Standards are at the core of these organizations—they develop standards and disseminate/sell standards documents, provide standards-related consulting and training, and often test (and certify) products for conformity. General membership SDOs usually develop standards for a broad range of products, well beyond any single industry, and solicit input from a broad range of stakeholders. The National Fire Protection Association (NFPA), for instance, counts among its more than 32,000 members engineers, architects, firemen, manufacturing firms, as well as representatives from the insurance industry, labor unions, and state and federal governments. Moreover, general membership SDOs "pride themselves on their fair and open standards process,"[47] which ensures the recognition of their standards as consensus standards. The most renowned general membership SDOs are the American Society for Testing and Materials (ASTM, recently renamed ASTM International to emphasize the participation of standards experts from Canada and some other countries in many of their technical committees) and the NFPA.[48]

Trade or Industry Associations

Trade associations are created to advance the interests of firms in a given industry. Developing standards is usually only one among their many activities. Given the organizational objective of the associations, participation in their standards developing process tends to be restricted to representatives of industry. Primarily funded by member firms' contributions, trade associations rely less than other private SDOs on the sale of standards to finance their activities. While not open to the general public, most of them strongly support (and are certified to follow) the rules of due process and consensus by the American National Standards Institute (ANSI) for their internal standards development procedures. Some three hundred U.S. trade or industry associations are also developers of standards, including the Aerospace Industries Association of America (AIA), the Association of American Railroads (AAR), and the American Petroleum Institute (API). Note that there are often several associations for a given industry, in some cases due to the parallel existence of multiple highly specialized organizations, in others due to several industry-wide associations competing with each other.

Professional or Scientific Societies

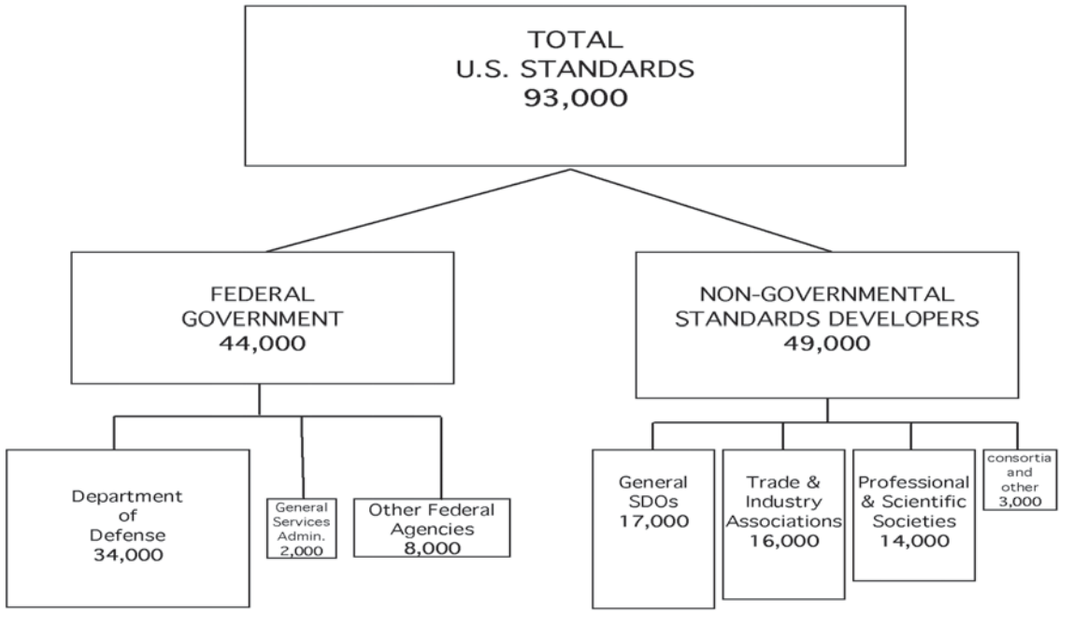
Professional or scientific societies seek to "advance theory and practice in a technical field."[49] The development of basic scientific and product standards is therefore a central activity for many of them. Indeed, many of them were first established by scientists and engineers for the purpose of developing standards of measurement, procedure, and products, in order to make the results of their work more communicable, comparable, and safe. While firms may encourage their employees' membership in a given professional society and "donate" the employee's time for participation in the standards development, standards experts are members and participate formally as individuals, not as representatives of firms. Due to the emphasis on engineering skills in most of these professional societies, industry representatives sometimes criticize their product standards as privileging technical optimization over profitability in a competitive market, but many of their standards are very highly respected for their technical quality. These organizations recoup a large part of the costs of engaging in standardization from the sale of standards docu-

ments.[50] The approximately 130 U.S. professional societies that are also important standardizers include the American Society of Mechanical Engineers (ASME, recently re-named ASME International, famous for its Boiler and Pressure Vessel code since 1910), the Society of Automotive Engineers (SAE, famous for its classification of engine oils), the Institute of Electrical and Electronics Engineers (IEEE, famous for plug and electrical appliance safety standards), and the American Conference of Government Industrial Hygienists (ACGIH, a private professional association of federal, state, and local health officials, academics, and industry representatives).[51]

CONSORTIA

Standards "consortia" are ad hoc groups of firms set up to develop a technical standard for a particular use. Since each consortium is set up for a particular purpose, consortia may differ greatly in structure and procedures and, lacking institutionalization and a fixed or permanent secretariat, they are, strictly speaking, not standards developing *organizations*. Due to this lack of a lasting institutional structure and their relative novelty, we know less about consortia as a general method of standards development, but some characteristics appear to be common to most consortia. Membership is usually determined definitively when the consortium is created, with every participating firm paying a substantial amount into a common pool that covers the non-personnel costs of the standardization work. Consortia tend to be formed by a small number of firms in the same industry, and it is often impossible for other firms to join a consortium that is already operating. (This "closed" character of consortia is one of the most common objections raised against them.) A standard developed by their technical experts tends to become a common property of the participating firms (or even just of the lead firm, but not of the consortium as a collectivity); it may be registered as a patent or even remain unpublished if it is for firms' internal use only. Whatever the exact arrangements to safeguard the participating firms' intellectual property, the objective is to produce a direct, tangible, private benefit for the

Figure 3.2 **U.S. Standards by Source**



Source: Toth 1996:2
Area of boxes is proportional to the number of standards developed, except for the boxes for GSA and consortia, which are disproportionately large.

participating firms. Once consortia have been set up and have worked successfully, however, they may well become over time more like traditional industry-association SDOs. Consortia are heavily concentrated in the information technology (IT) sector, since the traditional, institutionalized and consensus-bound standards development framework is often considered too cumbersome and time-consuming for fast-moving technologies. They also appear to be predominantly a U.S. phenomenon. A 1996 NIST study estimates there to be about 150 consortia and similar small-group developers of "informal" standards in the United States vis-à-vis 50 to 70 in the rest of the world—though this finding could reflect the earlier development of an especially large and vibrant IT sector in the United States.[52]

U.S. Standards By Source

As of 1996, when the last comprehensive study of standardization activities by U.S. industry associations, professional and scientific societies, and other SDOs was undertaken by the National Institute for Standards and Technology, there were about 93,000 U.S. standards (see Figure 3.2).

Well over one third of U.S. standards, about 34,000, are DoD standards, largely a consequence of the Pentagon's only slowly declining "insistence on special-purpose standards for military applications"[53] and its tendency to develop highly differentiated and precise purchasing specifications even for off-the-shelf items. The General Services Administration is the source of approximately 2,000 further government standards on record, some 75 federal departments and agencies the source of another 8,000. For the first time since these counts have been kept, the federal government now is the source for less than half (47.3 percent) of all current U.S. standards.
Of the 49,000 non-governmental standards, more than one third is developed by general standards developing organizations, another third is developed by trade and industry associations, and just under 29 percent is generated by professional and scientific societies. The remainder, just over 6 percent of all non-governmental standards, is estimated to be produced by standards consortia and similar informal standards developers.

The Role of the Government in U.S. Standardization

Consistent with the principles of U.S. political and business culture sketched above, the U.S. government has had a quite limited role in the development of product standards, although it became involved in the national harmonization of basic standards for science and industry in the late nineteenth century through the establishment of the National Bureau of Standards (NBS), which in 1988 became the National Institute of Standards and Technology (NIST).

Dramatic events such as the great fire of Baltimore in 1904 and the large-scale failure of ammunition in World Wars I and II, temporarily drew the federal government into the realm of "commercial" product standards and led it to encourage, pro-actively, increased standardization and better coordination among the plethora of private standardizers. Government involvement, however, never lasted, and attempts to give U.S. standards setting more structure or to facilitate cooperation among non-governmental SDOs mostly failed. Today, government employees from several agencies continue to participate in the standardization process of several individual private SDOs as representatives of particular agencies or as individuals (with the agencies approving and sometimes paying the membership fees), but the U.S. government as such has no role in ANSI, nor in SDOs like ASTM, ASME, etc. Despite increasing Congressional attention to issues of standardization and a recent one-time grant of $500,000 from the Department of Commerce (NIST) to ANSI, it remains fair to conclude that the U.S. government has "gradually relinquished" responsibility for product standardization "to the private standards development organizations" and does "little to promote the development of voluntary standards."[54]

In the realm of regulatory standards for products, the U.S. government (like many other OECD governments) is increasingly moving toward the use of standards developed by domestic and international non-governmental SDOs instead of developing standards de novo. Indeed, the importance of non-governmental standards for both government

procurement and regulation has greatly increased in recent years. This shift is in part motivated by the recognition that developing standards requires highly specialized technical expertise, which governments may not have and find too costly to acquire, leading to new, hybrid forms of public-private standardization. Greater reliance on non-governmental standards also has become explicit U.S. government policy. In light of this shift toward the use of non-governmental standards for public purposes, a closer look at the structure of U.S. non-governmental standardization is warranted.[55]

ANSI and the Persistence of Diversity/Fragmentation in U.S. Standardization

The most striking difference between the standardization systems in most European countries and the United States is the absence, in the United States, of a single dominant SDO or a hierarchically organized national umbrella organization that coordinates the standardization activities of the highly specialized technical committees and ensures that the process of standards development is consistent throughout the country. ASTM, the largest source of non-governmental product standards in the United States, accounts for about ten thousand standards–almost twice as many as the next largest American SDO (Pharmacopoeia), but still only just over 10 percent of current U.S. standards. This lack of a single authoritative source of "the" U.S. standard for a given product has some benefits, discussed below, but it comes at a price. The costs can be considerable. At the extreme:

> A given grade of copper-silicon rod stock may be produced and stored under any of the following standard designations: MIL-B-15939; ASTM B-150, Alloy No.1; SAE 701-B; AMX 4632B; Federal Specification QQ-B-666, Grade B; Army-Navy-Aeronautics Specification AN-B-11; Navy Specification 46B17, Grade B; and many proprietary or trade designations... Should the metal be purchased at different times … by different engineers in different departments, each one of the purchases might be carried in the stockroom and on the records as a separate item.[56]

Government initiatives have rarely sought and never accomplished a significant decrease in the number of–or increase in cooperation among–U.S. standards developers. Although American industry and engineers have repeatedly pushed for greater harmonization and coordination of standards development, even their efforts have only been modestly successful. The realization that standards of different SDOs often overlapped and even conflicted with each other led in 1918 to the establishment of the American Engineering Standards Committee, AESC, which initially brought together the mechanical, electrical, and mining engineering societies and ASTM. In 1928, the committee broadened its activities and changed its name to American Standards Association, ASA, which became a highly successful standards developer but not an effective national umbrella organization. In the late 1960s, ASA transformed itself into the American National Standards Institute (ANSI), which exists to this day. Since ASA's ambition (and mission) to become the comprehensive national umbrella organization for the development of non-governmental standards had been hampered by other U.S. SDOs' perception of ASA as a competitor, ANSI gave up all standards development of its own. ANSI sought instead to become strictly a coordinating institution. It took steps to improve the flow of information (so as to minimize the likelihood that several member organizations might develop standards for a given product without knowing of each other's work) and sought to serve as a clearing-house for standards through the certification of standards development processes as compliant with due process consensus procedures. A standard developed by an SDO that is certified as "ANSI-accredited" can be published as an "American National Standard."

ANSI has gained recognition as the U.S. representative in the International Organization for Standardization (ISO) and several other international and regional organizations for non-governmental standards setting. It plays an important role in promoting the use of standards developed by U.S. SDOs internationally, and has recently coordinated industry, U.S. SDOs, and government agencies in the development of a "U.S. National Standards Strategy."[57] ANSI's role, however, remains contested, especially among the key U.S. SDOs that depend largely on their income from standards sales. That income, they fear, along

with their ability to compete, would be diminished if they were obligated to coordinate through ANSI.[58]

Conclusion

Two features of the U.S. standardization system have important implications for the operation of the system and ultimately also for foreign firms considering direct investments in the U.S. The first is the commercial character of U.S. standardization; the second is its fragmentation.

The commercial character of the U.S. standardization system puts greater emphasis on the private benefits derived by U.S. industry from standardization, rather than on public benefits. The emphasis on private benefits is reflected in the requirement that participants pay for participation in standards developing committees, putting non-commercial groups at a distinct disadvantage. Unlike in Germany and Europe, U.S. consumer or environmental groups, for example, cannot count on government subsidies via standardization bodies to defray the cost of their participation, nor on government regulations to require that their interests receive a fair hearing. From an industry perspective, the more homogenous background of the participants in U.S. non-governmental standards development might make it easier and faster to achieve consensus and increase the commercial appeal of the resulting standards. The exclusion of non-commercial stakeholders, however, may reduce the effectiveness of standards in achieving other objectives, such as providing safeguards against lawsuits.

The second distinctive feature of U.S. standards development is the low level of coordination. U.S. standardization is not just decentralized, it is fragmented—and the fragmentation is increasing: by the latest count, the U.S. standardization process comprises more than 700 organizations, more than 600 thereof non-governmental.

There are, to be sure, benefits to a system in which many SDOs fiercely compete with each other. Since firms or their employees can leave a U.S. SDO at any time and stop using its standards, U.S. SDOs have strong incentives to develop and maintain standards of high quality and to ensure that technical committees are not captured by one or a few companies seeking to gain a competitive advantage. Moreover, by having multiple avenues for standards development (and as sources of domestic standards) open to them, U.S. firms may be in a better position than firms abroad to experiment with alternative technical solutions, which is often presented as a safeguard against technological lock-in.[59] These advantages lead U.S. firms to view standardization less as a coordinating device than as an additional means of competition.

Notwithstanding the benefits, however, there are clearly also costs to having such a fragmented system. Standards development through multiple parallel channels leads to a resource-intensive duplication of efforts that is often without benefit. Even worse, it leads sometimes to inconsistencies and contradictions that counteract central objectives of standardization. And it disadvantages American firms in international standards developing organizations, because it undermines their ability to speak with a single voice. These consequences, including the prospects for change, will be analyzed at greater length in the concluding chapter.

04

CHAPTER FOUR

GERMANY AND THE UNITED STATES IN INTERNATIONAL STANDARDIZATION

TIM BÜTHE AND JAN MARTIN WITTE

The Internationalization of Standardization

In Congressional hearings, GATT/WTO negotiations and transatlantic discussions, divergent product standards have increasingly been recognized as one of the most important non-tariff barriers to trade. Americans and Germans have been among the leading champions of the resulting calls for internationally harmonized product standards as part of an effort to expand global trade and investment according to the formula: "One standard, one test—accepted everywhere."

Among the fruits of these efforts have been the bilateral U.S.-E.C. Mutual Recognition Agreement of 1997 and the 1994 WTO Agreement on Technical Barriers to Trade, which obliges WTO member states to use "international standards" as the basis of their product regulations, whenever they exist and can achieve the legitimate objectives of the regulation. As trade continues to grow faster than world GDP, and trade in manufactured goods continues to grow faster still, international standardization is becoming ever more important—and consequently more contentious. This chapter analyzes product standardization at the international level and discusses the major differences in the German and American experiences with internationalization of standards setting.[60]

The International Standardization System

The international standardization system comprises numerous organizations that develop product standards. The legal form and organizational structure of these bodies varies considerably:

Intergovernmental bodies have been formed to develop official international standards for products or aspects of products with a major public interest at stake. These include the ITU, the Codex Alimentarius Commission, and UN/ECE. Most of these organizations are part of the U.N. system; as a result, governments are the members.[61]

International non-governmental SDOs are private, but widely publicly recognized international bodies, comprised of national delegations, whose primary purpose is to develop international product standards. The largest such bodies are ISO and IEC, which between them produce (according to their own estimates) about 85 percent of all international consensus standards (ISO's portfolio alone contains more than 13,700 standards).[62]

Other standards developers and fora for the discussion of international standards include American SDOs that are open to non-U.S. members and develop some widely used standards, as well as international trade associations or other professional organizations that provide a forum for discussions on standards issues and an exchange of information on best (and worst) practices. Whether standards developed by any of these other organization should be

considered international standards is much disputed. What exactly constitutes an "international standard" (for instance for purposes of the WTO Technical Barriers to Trade Agreement (TBT Agreement)) is a contentious issue between Europe and the United States. Many Americans argue that all SDOs that have no nationality-based membership restrictions and product standards used in more than one country should be considered producers of international standards. This would include bodies such as ASTM and ASME, which feature non-U.S. participation in their work and some of whose standards are used in numerous countries around the globe. Germans and other Europeans usually maintain that an organization's claim to being simultaneously national and international leads to conflicts of interest and incoherence, and that only those international SDOs that provide for equal representation of each country and consensus procedures, such as ISO and IEC, are legitimate producers of international product standards.

This disagreement remains unresolved so far. This report focuses on ISO and IEC, because they are the largest producers of international product standards and accepted by everyone (including American firms) as sources of international standards, whereas others' claims to this status are contested.

ISO AND IEC STANDARDIZATION

ISO and IEC are privately incorporated international organizations. The ISO was created in 1947 as the successor organization to the International Federation of Standards Associations.[63] The IEC was created in 1906 in London. Both organizations relocated to Geneva after the end of World War II. ISO has 187 technical committees, 532 subcommittees, and 2,105 working groups, in which most of the actual standardization work is done. The IEC currently maintains 170 technical committees and 529 working groups. Sixty-five percent of ISO's core budget of approximately $20 million (mostly for the central secretariat) is funded by membership contributions; the remainder is generated through the sale of standards and other publications. IEC's smaller budget (ca. $3 million/year), is funded similarly.[64]

An in-depth examination of ISO and IEC structures and work procedures is beyond the scope of this report, but four key issues warrant a brief discussion.

Membership and national representation: ISO and IEC membership is organized along national lines and open to the one national body "most broadly representative of standardization" in each country. While about 70 percent of ISO members are closely linked to their countries' governments (fewer in OECD countries), it is not governments that are represented in ISO and IEC. Currently, ISO has 94 voting members, IEC 51.

Standardization procedures: The ISO and IEC use a five-stage process to develop technical specifications (see Figure 4.1), and they take decisions by consensus (and via a formal vote at the final two stages). To affect the specific content of a standard, early involvement in the process is crucial, since it is difficult to reverse earlier consensus decisions (see chapter 1). The decentralized nature of work in highly specialized ISO and IEC technical committees and working groups also requires effective information dissemination from top to bottom to enable individual firms to gain early and accurate access to the information they need.

Figure 4.1:

Hosting of ISO/IEC Technical Committees (TCs): The TCs, subcommittees, and working groups, where the actual standards development takes place, are not administered by the ISO and IEC central secretariats, but instead are hosted (and administratively funded) by national member bodies. Hosting a TC or convening a working group grants to the country's industry agenda-setting power and therefore can give it a competitive advantage in shaping the standardization work of that committee.

Voting: Despite the general use of consensus procedures, the adoption of the resulting draft international standard (DIS) and the final adoption of a technical specification as an ISO or IEC standard is decided by vote, with each member body having one vote (see Table 4.1). As a result, regional economic groups such as the EU might vote "en block." Indeed, American standards experts and policymakers have claimed for years that the EU is pervasively abusing this structural advantage to push through European technical preferences against American preferences. However, an internal review of voting in the ISO has shown that these allegations are baseless. ISO standards approval requires large super-majorities.[65] If ISO standards were regularly brought to a vote and/or adopted only because European member bodies were pushing them through, a large number of objections should be registered in ISO votes, since all of ISO's current 94 members can vote in the voting stages. This, however, is clearly not the case. Voting data from 1998 to 2001 show that most standards are approved either without any negative votes at all or with only a single negative vote, at both the DIS and the final draft international standards (FDIS) stage.[66]

Germany and Europe in the International Standardization System

The German Institute for Standardization (DIN) is a highly visible and by most accounts very effective player in international standardization. As set out in its mission statement, DIN acknowledges the primacy of international standards, and it recognizes ISO and IEC as the two authoritative sources for international standards. German firms participate in international standardization projects through national delegations, usually appointed by national "mirror committees." For

TABLE 4.1
VOTING ON DRAFT AND FINAL DRAFT INTERNATIONAL STANDARDS IN ISO

	standards dispatched for voting		standards approved without any negative votes		approved with more than 1 negative vote	failed standards (not approved in vote)	
	DIS	FDIS	DIS	FDIS	DIS	DIS	FDIS
1998	987	833	460 *46.6%*	452 *54.3%*	235 *23.8%*	35 *3.5%*	1 *0.1%*
1999	904	781	378 *41.8%*	500 *64.0%*	251 *27.7%*	27 *3.0%*	4 *0.5%*
2000	901	735	407 *45.2%*	426 *58.0%*	213 *23.6%*	32 *3.6%*	0
2001	771	534	400 *51.9%*	312 *58.4%*	168 *21.8%*	18 *2.3%*	2 *0.4%*

Note: Voting data for ISO votes. DIS: Draft International Standards. FDIS: Final Draft International Standards. Data only includes records on DIS and FDIS emanating from ISO and ISO/IEC joint technical committees. Source: ISO Council 2002: Annex 2. 2001 data are based on data from January 1-December 13 2001.

each ISO or IEC technical committee, there exists a DIN mirror committee that aggregates domestic interests of various stakeholders into a single national position. The mirror committees elect a national delegation to the international standards committee. National delegations are obligated to represent the decisions taken by the mirror committee. The German government subsidizes DIN's membership fees for ISO and IEC, and also covers other project-related costs.[70]

Germany's commitment to, and deep involvement in, the work of ISO and IEC has a long history. Practically since their inception, DIN has been a major player in ISO and IEC.[71] This enthusiasm for international standardization should not come as a surprise. Much of Germany's postwar economic success was a result of its thriving export industry. Consequently, export-oriented German firm have always had an intrinsic interest in the international harmonization of standards to open foreign markets.[72]

DIN's extensive engagement in ISO and IEC is reflected in a variety of indicators. Most significantly, DIN is hosting 29 of ISO's 187 TCs, 90 of its 532 subcommittees, and 345 of its 2,105 working groups. Roughly 27 percent of all DIN standards published in 2002 were fully identical with ISO or IEC standards.[73] Moreover, DIN is a major contributor to ISO's and IEC's core institutional budgets,[74] and the Managing Director of DIN (Dr. Thorsten Bahke) is currently a Vice-President of ISO. Through the national delegations formed under DIN auspices, German industry sends a substantial number of experts to ISO and IEC committees and working groups, a time-consuming and therefore costly activity.

In addition, DIN and ISO/IEC share a common "standards philosophy" that makes it easy for German stakeholders to operate in the international environment. For instance, both DIN and ISO/IEC agree on the necessity to maintain a "coherent" international standards system, which results in a single standard for any given product. Also, both sides regard standards as goods that have quintessential public goods features. As a consequence, both DIN and ISO/IEC concur that a purely market-based standards development process will not generate socially desirable results.[75]

The benefits of this shared "standards philosophy" are bolstered by a high degree of complementarity between the institutional structures of DIN and those of ISO/IEC, as pointed out by Mattli and Büthe.[76] As noted above, ISO and IEC procedures put a premium on early involvement in the standardization process and effective aggregation of preferences into a single national position. On both counts, DIN is well suited to provide German stakeholders with strong influence in ISO/IEC standards development. DIN is a crucial supporting institution for cooperation among German firms, playing the role of a knowledge disseminator and information clearinghouse. In addition, the hierarchical structure of voluntary product standardization in Germany facilitates efficient and effective aggregation of national standards interests through DIN's mirror committees and national delegations to ISO and IEC committees.

In addition to direct participation in and influence on the work of ISO and IEC, Germany also has an indirect influence on international standardization through the European standardization organizations, CEN and CENELEC. Neither CEN nor CENELEC is a voting member of ISO or IEC. Yet, the emergence in the 1990s of CEN and CENELEC as major regional standardization organizations presented a formidable challenge for both ISO and IEC. In essence, the emergence of these regional platforms for product standardization threatened to undermine the European commitment to international standardization. The politically induced drive towards European standardization tied down substantial resources, and threatened to result in a massive duplication of work. For that reason, the European and international standards bodies decided to negotiate bilateral cooperation agreements.[77]

In the case of ISO and CEN, the so-called "Vienna Agreement" was signed in 1991.[78] The agreement features two simple cooperation procedures: Under the first and dominant one, ISO takes the lead in the development of a new work item, and CEN (instead of launching a new work item of its own) simply adopts the international standard through parallel voting. The second cooperation procedure, to be used when EU directives require development of a European standard by a certain date, reverses the process. Note

that neither CEN nor ISO is obligated to adopt a standard developed under the leadership of the other. Under both scenarios, the relevant rules of ISO and CEN for standards development apply. This arrangement, however, also means that in cases where a standard is developed under CEN-lead, non-European interests are excluded from the work process (except for four observers appointed through ISO).

The Vienna Agreement has come under sustained criticism from U.S. SDOs. For example, Jim Thomas, CEO of ASTM International, has suggested that the agreement is part of an effort to "transmute" European standards into international standards, demonstrating Geneva's bias in favor of European standards interests.[79] The comparatively small number of standards developed under CEN-lead, however, suggests that the European influence on ISO work is not as large as critics contend.[80] In 2002, ISO maintained roughly 5,000 work items. Of these 5,000 projects, only about 300 (or 6 percent) were under CEN lead as part of the "Vienna Agreement."[81] In addition, repeated calls by the European Commission to forge a European "single voice" in international standardization through CEN and CENELEC have been rebuffed by European national SDOs.[82]

The United States in the International Standardization System

The U.S. representative in ISO, the American National Standards Institute (ANSI) is a founding member of ISO, one of five permanent members of its Governing Council, and one of only four permanent members of ISO's Technical Management Board. Yet, ANSI is considered less effective in representing the interests of its national firms and other stakeholders in ISO than some other countries' ISO member bodies, including DIN. This is to a large extent a consequence of the structure of the U.S. system of standardization, examined in chapter 3, which exhibits a low level of institutional complementarity with the international system.[83]

In contrast to DIN, ANSI is not itself a standards developing organization, but an association of American SDOs. ANSI "credentials" technical experts (almost always employees of private sector firms) to serve as U.S. delegates to technical committees, subcommittees, and working groups and forms a "Technical Advisory Group" at the domestic level to develop a U.S. national position to be presented by the U.S. delegate(s). These technical advisory groups are ANSI-appointed, but administered by one of the-often multiple, competing ANSI-accredited U.S. standards developers.

That U.S. interests are disadvantaged in international standardization seems at first rather puzzling, given that U.S. firms and other stakeholders start from a powerful position: Actual standardization work in all technical working groups has long been—and continues to be—conducted virtually entirely in English, allowing U.S. representatives to argue their points of view in their native tongue. Even more importantly, American technological leadership in many industries means that many U.S. standards "formed the basis for standards issued [and] promulgated by ISO …," and for a long time U.S. domestic "standards were more prominent in world trade than the then available international standards."[84] Moreover, the size of the American economy makes it highly desirable for foreign firms that their products comply with the pertinent American standards.

At the same time, the sheer size of their domestic market until recently led many American firms to pay much less attention to export opportunities than their European counterparts. U.S. industry consequently tended to be complacent toward international standards development—and to presume that any international standard that is not based on American technical specifications cannot be motivated by the existence of technologically superior alternatives, but must be the result of foreign (industry or government) manipulation of the standards development process. For decades, American firms exhibited little interest in participating in international standardization, and ANSI and its member bodies showed very limited interest in hosting technical committee secretariats or acting as the convenors of working groups.

In the 1990s, however, U.S. interest in international standardization increased greatly, at least partly in response to mobilization efforts, of which the 2000 "National Standards Strategy for the United States"

is the latest product. By 1998, U.S. standards developers (nominally as parts of ANSI) held the secretariats for 31 technical committees (16.8 percent), 110 subcommittees (18.7 percent), and 431 working groups (21.3 percent), making the United States the country holding the largest number of leadership positions. The greater prominence of the U.S. in ISO is also apparent in the election of Oliver Smoot, long the chairman of ANSI, to a two-year term as President of ISO, which started in January 2003, following sixteen years (1986-2002) during which Lawrence Eicher, former director of engineering standards at the U.S. NIST, served as ISO's secretary general.

So why has the United States been less successful in influencing the technical specification of international standards than one might expect? The predominant U.S. approach to standards–grounded in U.S. economic history, the structure of the American political economy, and cultural/philosophical traditions that emphasize market competition and arms-lengths relations–differs greatly from the approach to standardization that pervades thinking in the ISO. There, standardization is primarily perceived as a cooperative endeavor to find technically optional solutions to problems with an important public interest component.

Even more importantly, the "anarchic" and fragmented institutional structure of standardization in the U.S. makes for a poor fit with the institutional structure of the international SDOs like ISO. As Mattli and Büthe show in greater detail, the influence of U.S stakeholders at the international level is limited by three factors: the competition among U.S. standardizers; the lack of well institutionalized mechanisms for aggregating the preferences of U.S. producers, consumers, and other affected parties; and the unwillingness of other U.S. standards developers to submit to ANSI's leadership internationally. Last but not least, ANSI also does not offer financial support to defray the cost of travel of U.S. participants to international meetings of standardization working groups, which limits the experts available to represent U.S. interests in international non-governmental standards bodies.

Conclusion

International standards are rapidly gaining prominence. ISO and IEC are the principal international organizations for the development of international product standards. The structure of the ISO and IEC as well as their consensus-based standardization procedures–established many decades ago–favor countries that have hierarchical domestic standardization systems, which facilitate information sharing and quick and efficient interest aggregation. Such a system exists in Germany. In contrast, the decentralized standardization infrastructure in the United States impedes effective participation in international standardization organizations. U.S. firms consequently are on average less effective in influencing the international technical specifications developed in ISO and IEC than their German and European counterparts. This institutionally induced disadvantage has triggered angry protests by the American side against ostensible European "foul play" as well as efforts to increase American engagement with ISO and IEC. Yet, while American firms have stepped up their presence in ISO and IEC, they have not managed to tackle the fundamental structural problems in the United States that inhibit their effective participation in international standards development.

05

CHAPTER FIVE

CONCLUSIONS AND POLICY RECOMMENDATIONS

TIM BÜTHE AND JAN MARTIN WITTE

Standards play a crucial—if often overlooked—role in firms and in the economy at large, reducing transaction costs; enabling economies of scale; facilitating quality control; and boosting staff, consumer, and environmental protection. At the same time, cross-nationally divergent product standards have over the past twenty years emerged as one of the most prominent non-tariff barriers to trade, and political economists and policymakers are also beginning to recognize their importance for foreign direct investment (FDI).

This chapter provides a brief analytical overview of the major findings of the study, examines the implications of the tradeoff between divergent national standards and the international harmonization of standards for foreign direct investment, and offers some general conclusions. Based on this analysis, the study concludes with a set of policy recommendation for both firms and policymakers in the United States and Germany.

Summary of Findings

Product standards have gained increasing prominence in the transatlantic marketplace, where one third of global trade and more than half of global FDI takes place.[85] Consequently, standards have also become an increasingly contentious issue between the United States and European countries. These transatlantic differences largely turn on how standards are developed and by whom, both at the national and international level.

After an introductory analysis of the role of standards in the economy, this study examined, first, standards setting at the national level in Germany and the United States, focusing primarily on the institutional structure and decision-making procedures of standards developing organizations (SDOs), where firms and other stakeholders cooperate voluntarily in known technical committees or working groups in the development of the technical specifications of a given product standard. We have identified a number of cross-national differences, which reflect diverse political-economic and philosophical traditions that shape the U.S. and German approaches to standards and standardization in popular and business culture as well as the law.

Most importantly, there is a greater emphasis in Germany than in the United States on standards as a public good and a means of voluntary, yet highly institutionalized self-regulation by industry (with publicly funded participation of representatives of consumer interests, labor, environmental groups, and other stakeholders to ensure broad acceptability). In Germany, the development of industry standards takes place under the umbrella of the national SDO, the DIN (and its electro-technical sister organization, DKE), which is a non-governmental organization, but is publicly subsidized and regulated. Actual standardization work is conducted in technical committees or working groups that bring together highly specialized engineers, scientists, and other representatives of industry with a small number of representatives of non-commercial interests. The work of the technical groups as such is decentralized, but closely coordinated through DIN, whose institutional structure ensures that there will only be a single national standard for a given product in the end.

U.S. firms tend to see standards not as public goods, but primarily as a means of gaining competitive advantages in the marketplace through the early establishment of a preferred technical solution as an industry standard. Reflecting a general preference for pure

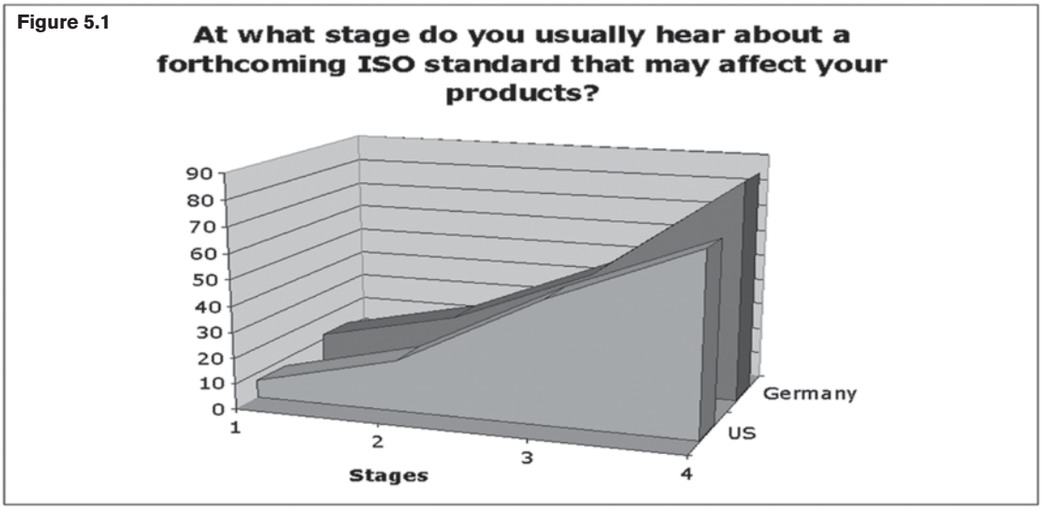
market solutions and greater hesitation toward institutionalized cooperation, standardization in the U.S. is highly fragmented. For numerous products, several American SDOs have developed competing standards. Hundreds of SDOs operate in the United States without an effective umbrella organization to coordinate their activities or aggregate their preferences into a common U.S. position on standards issues, and without public oversight.[86]

For many years, the German and U.S. systems appear to have served their domestic economies similarly well, notwithstanding some shortcomings. There is no indication, for instance, that either one of them results in technically superior standards. In their domestic contexts, these systems differ primarily in *how* they operate.

This equivalence of functionality, however, no longer holds. The globalization of product markets has intensified the need for not just *national* industry-level product standards, but international product standards. Increasingly, therefore, standards setting is moving to the international level. In this context, the institutional differences emphasized in this study affect the relative ability of U.S. and German firms to influence the technical content of international product standards. In the predominant international SDOs, the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC), the ability to pass on information quickly and efficiently from the top down (i.e. from the international technical committees to domestic firms and stakeholders) and to aggregate preferences from the bottom up (so as to arrive at an agreed national position) are crucial to a country's ability to take advantage of consensus decision-making procedures. Due to the high level of coordination and the institutional hierarchy in the German standardization system, the German ISO representative, DIN, is more effective in giving its domestic stakeholders access to international standardization than its American counterpart, ANSI.

The effects of this difference are apparent at all stages of the ISO standardization process. The business survey conducted by the International Standards Project among some 1500 firms in several manufacturing sectors in the United States and four European countries in 2002-2003 asked respondents, inter alia, at what stage they usually hear about a forthcoming ISO standard that may affect their firm's products. As discussed in chapter 4, ISO standardization proceeds through five stages, the last one of which is the adoption and publication stage (at which point the standard is definitively set). Figure 5.1 shows for each of the prior four stages the cumulative percentage of American and German firms that indicate usually knowing of the standardization work by that stage. At each stage, the share of German firms that know about relevant standardization work underway in ISO is clearly higher than the share of U.S. firms. This

Figure 5.1



difference is most pronounced at the first and most crucial stage, where 7 percent of U.S. firms compare to 12 percent of German firms (a relative difference of more than half!) and at the fourth, public inquiry stage, where 70 percent of U.S. firms contrast with 85 percent of German firms.[87]

The cross-national institutional differences also have important implications for the extent to which firms face adjustment costs when new standards are proposed at the international level. The share of U.S. firms, for instance, for which a proposed new international standard differs from their current practice (or products) half of the time or more frequently, is twice as large as the share of German firms for which this is the case.[88]

Whereas domestic-level institutional differences thus have a major effect in international standardization, this study shows that the ISO's one-country/one-vote system, which U.S. policymakers often blame for standards that turn out unfavorable to U.S. interests, appears to play no significant role.

Standards and Foreign Direct Investment

The importance of product standards for foreign direct investment (FDI) follows from the functions that standards play in the economy and from the motivations for FDI in general. Empirical studies of firms' decisions whether–and where–to invest abroad, unfailingly identify predictability of the economic and political context as a key factor. Therefore, most generally, the existence of clear and explicit standards, developed through transparent processes, should make a country more attractive for foreign direct investment since they make the regulatory environment more predictable and allow firms to anticipate the characteristics that will be expected of their products in the market place.[89]

Standards also affect the location and type of FDI. The literature on foreign direct investment distinguishes two major types of FDI: (1) Horizontal FDI refers to an arrangement where a firm maintains production facilities in multiple countries, and each facility transforms raw or intermediate inputs into finished products for sale in its local (domestic) market. Transport costs, tariffs, and non-tariff barriers are classic motivations for horizontal FDI, which is primarily a substitute for trade. (2) Vertical FDI refers to an arrangement where at least two stages of production exist and can be geographically separated to take advantage of cross-national differences in factor endowments. Lower wages at comparable skill levels or the local availability of natural resources are classic motivations for vertical FDI. Because vertical FDI involves importing inputs or intermediate products and exporting the finished good from the market in which the last stage of the production process is located, it is a complement to trade.[90]

Figure 5.2a US firms

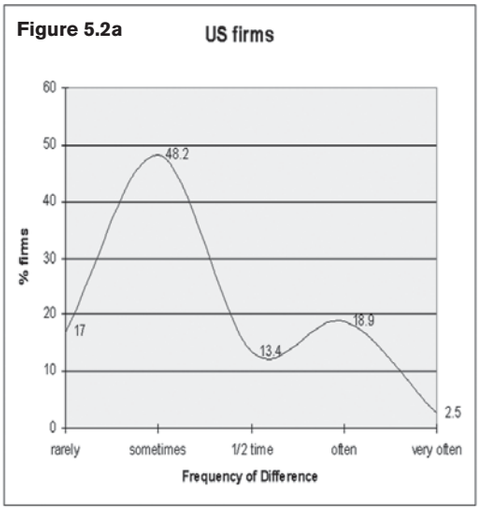
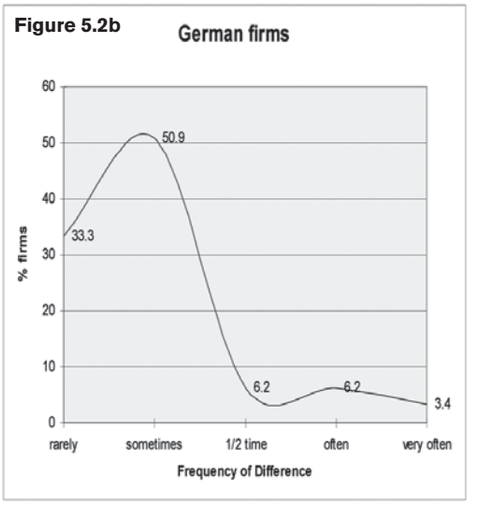


Figure 5.2b German firms



Divergent standards, which act as non-tariff barriers to trade, encourage horizontal FDI, i.e. parallel production in each market for that market, at least insofar as producing to a local market's standards (or getting products certified for compliance with those standards) is facilitated by locating production facilities within that market. Internationally harmonized standards, by contrast, encourage vertical FDI, i.e. locating in each market those stages of the production process that can be most efficiently conducted in that market. Because of these efficiency gains, international harmonization should also result in overall higher economic growth—though the uneven distribution of adjustment costs may require some redistribution to make it beneficial for all.

Moreover, divergent standards (at any level) fragment the market and therefore impede achieving economies of scale. Cross-nationally divergent standards are therefore a serious problem for countries whose domestic markets are too small to warrant horizontal FDI. This is primarily an issue for developing countries, but it also affects small highly developed countries.[91] For the United States and Germany, this would seem to be of minor importance, as they can offer potential foreign direct investors two of the largest domestic markets anywhere. Yet, even large OECD countries are likely to become less attractive locations for manufacturing investment if their domestic standards differ from international standards for the same goods, because many developing countries—including fast-growing markets and potential targets for exports, like Brazil and India—increasingly adopt international (esp. ISO/IEC) standards instead of developing their own national standards.[92]

Finally, U.S.-European differences in domestic standards institutions provide a—probably not yet fully realized—additional incentive for foreign direct investment by U.S. firms into Europe. The survey of some 1,500 U.S. and European firms by Büthe and Mattli found that U.S. firms with subsidiaries in Europe are able to receive information about ongoing international standardization work and communicate their technical preferences almost like European firms. This suggests that FDI into Germany and Europe affords U.S. firms better access to international standardization.[93]

Analytical Conclusions

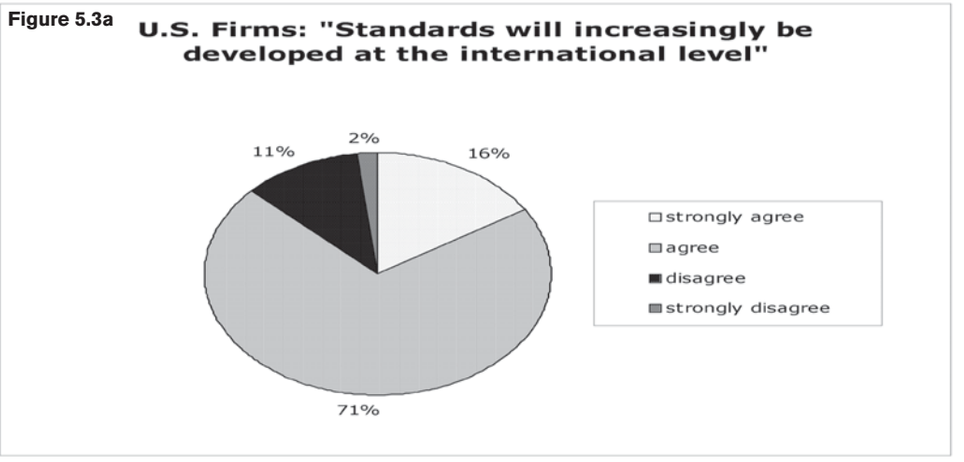
Four general conclusions follow from this analysis:

1. Standardization as a Political Process: Product standardization is neither a narrowly technical activity of engineering optimization, nor simply a tool for achieving market dominance. Rather, it combines both elements in a political process that is dominated by private actors in non-governmental institutions. In this political process, there is not just one single, unambiguously optimal solution but, instead, there are multiple solutions, each with distinct distributional implications. Which technical specification is chosen is largely a consequence of which actors participate—and how the standards setting institutions aggregate their preferences.

2. Centrality of Private Actors: In both Europe and the United States, as well as at the international level, standardization overwhelmingly takes place in non-governmental institutions, with important implications for the operation of the standards developing process. The private sector—especially firms and individual professionals (mostly engineers and scientists)—are the key players in the process of setting standards. Non-commercial interests (such as environmental and consumer advocates) are influential when they are well organized and possess the requisite technical expertise. Governments play a secondary role *on both sides of the Atlantic*, though in European countries they oversee due process and provide public interest financial support.

3. Globalization and the Importance of Institutions: The internationalization of standardization does not "diminish" the importance of national standards organizations.[94] Rather, it changes the role of domestic organizations from autonomously developing standards to collecting and disseminating information to companies and other stakeholders at the domestic level, aggregating technical preferences, and participating in international standardization through the delegation of expertise and the provision of the institutional infrastructure that makes international standardization possible.

Figure 5.3a



4. Change and Persistence: While international standardization is clearly leading to a convergence of product standards, significant convergence of standards setting institutions should not be expected, despite the apparent benefits of a more hierarchically structured, coordinated system. Standardization systems in Germany (at the national and European level) as well as in the United States have changed in important ways in recent years, but they remain deeply embedded in the domestic political economy and each country's history and culture. Seeking wholesale change of either system therefore seems unrealistic and potentially counterproductive, but changes can be made that improve each system's performance while remaining compatible with the organizing principles of each national economy.

Policy Recommendations

This analysis has some important implications for firms, standards developing organizations, and public policy. In this concluding section, we will spell out some of the most important implications in a set of policy recommendations for these groups in Germany and the United States, respectively, as well as at the international level.

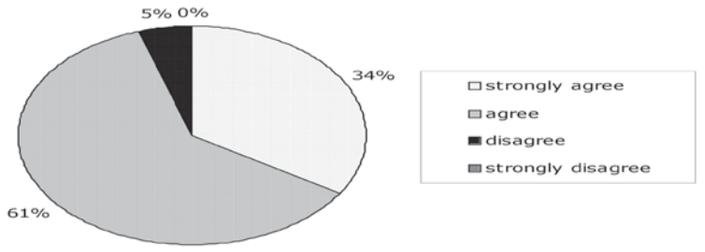
CONSEQUENCES OF THE DIFFERENT EXPERIENCES WITH INTERNATIONAL STANDARDIZATION

The different experiences of U.S. and German firms with international standardization, especially the different ability of German and U.S. firms to influence the technical specifications of international standards, also affect their assessment of the shift of standardization to the international level in striking ways. Firms' own actions and public policy should seek to redress this difference, so as to facilitate transatlantic cooperation.

As part of the survey by Büthe and Mattli, firms were asked to share their assessment of some trends currently underway. When asked factually about the shift of standardization to the international level, German firms were even more confident than U.S. firms that this shift will continue, but the vast majority on both sides of the Atlantic agreed (or strongly agreed) that standards will be increasingly set at the international level (see Figures 5.3a and 5.3b).

When asked for their normative assessment of this shift to the international level, however, U.S. and German firms differed markedly. The German firms still overwhelmingly indicated their approval, whereas U.S. firms were almost evenly split between those who thought that the shift to the international level is a positive development and those who see it on balance as undesirable (see Figures 5.4a and 5.4b).

Figure 5.3b German Firms: "Standards will increasingely be developed at the international level"



IMPLICATIONS FOR BUSINESS

Recommendations for German Firms

- Maintain high levels of involvement in institutionalized standards setting;
- Raise awareness of the benefits of standards among senior business leaders.

On the whole, German firms do very well under current conditions. The same institutions that have long facilitated technical cooperation at the domestic level, such as DIN, also facilitate their participation in institutionalized cooperative standards setting at the international level, which is increasingly beneficial as the globalization of product markets leads to a shift of standards development from the national to the international level.

It is easy for German firms to forget under such circumstances why the current system works so well for them. In particular, it is easy to forget that an ongoing commitment is required to maintain the network of technical experts that underpins institutions such as DIN and indirectly ISO. Moreover, the costs of "donating" an employee's time for work in an SDO technical committee or working group and for his/her travel and accommodations are readily apparent, whereas the economic benefits are much harder to estimate–especially since the maintenance of technical standards of high quality in a continuously changing technological context requires firms to continue contributing resources even when standards remain largely unchanged, and when the initial boost in profitability from standardization has already been absorbed into the baseline of expectations. Standardization work thus can easily appear like an attractive target for painless cost-cutting, which becomes apparent as a fallacy only after some time.

The greatest danger for German firms therefore is that they will undermine their own success through reduced participation in the institutionalized process of standardization in the hope that others will compensate for their free-riding, so that the system as a whole will continue to work. Repeated reports of a declining willingness among German senior managers to fund their employees' participation in standardization activities indicates that this danger is real. DIN (like other national SDOs in Europe) has made considerable progress in replacing contributions to its operating budget from firms with income generated from subsidiaries, and other measures can be taken to enhance efficiency within the organization but there is no alternative to firms as the source for the bulk of the requisite technical expertise. The analysis presented here suggests that maintaining high levels of involvement, both in domestic and international standardization, will be crucial for the continued success of German firms in the realm of product standards.[95]

Figure 5.4a U.S. Firms: "Standards should be developed first and foremost at the international level"

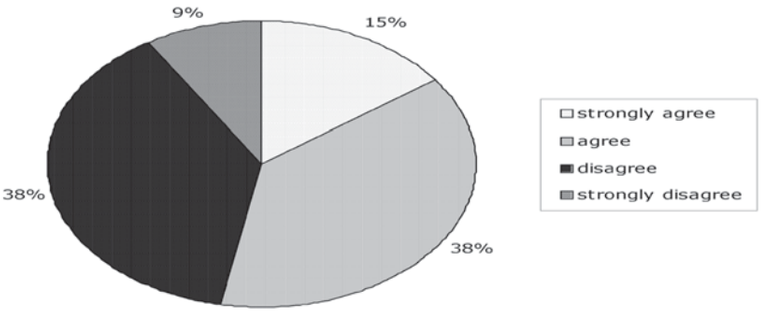
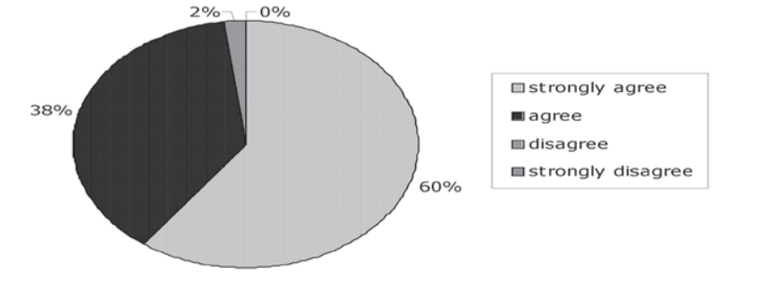


Figure 5.4b German Firms: "Standards should be developed first and foremost at the international level"



Recommendations for U.S. Firms

- Continue to raise levels of involvement;
- Raise awareness of the significance of standards among senior business leaders;
- Rethink the nature of standards in recognition of public goods characteristics.

American companies have, on the whole, made great strides in recent years to improve and increase U.S. participation in institutionalized standards setting, especially at the international level. These very recent changes cannot fully compensate for the structural disadvantages resulting from the fragmentation of U.S. standardization, but preliminary evidence suggests that the increased willingness of U.S. firms to send representatives to ISO technical committees, subcommittees and working groups (and take on an impressive amount of leadership positions within those committees and groups) is improving the ability of American firms to get their technical preferences taken into account in the development of new and

revised international standards. The analysis presented here suggests that the single most important contribution that American firms can make to improving the U.S. position in the realm of standardization is to increase their engagement with ISO and IEC standardization or to maintain increased participation in industries with already much improved levels of involvement.

Notwithstanding the increased participation of U.S. private sector engineers and scientists in domestic and especially international standardization, U.S. business leaders are still insufficiently aware of the strategic and economic significance of international standardization. Raising such awareness through targeted information could lead to a lasting improvement of U.S. participation and effectiveness in international standardization. Business associations such as the Chamber of Commerce, with its network of contacts to the local business community, and nationwide organizations such as the Conference Board could play an important role in this effort.[96]

U.S. firms also would benefit from an open-minded reexamination of their approach to standardization. Many standards have public goods characteristics, and ever more so as governments increasingly rely upon standards that have been developed by private technical experts, voluntarily cooperating in non-governmental organizations, as the basis for regulations. This provides opportunities, and in fact the need, for new public-private partnerships. Yet, business-government relations in the U.S. are often characterized by an ideologically motivated antagonism, where business owners and senior managers often see themselves in inherent opposition to government. Proposals—by members of the U.S. business community—for increasing the coherence of, and coordination in, U.S. standardization with the help of the federal government have therefore often been rejected out of hand. Focusing instead on identifying where and how government can be a useful facilitator (and where it cannot)—a general issue on which much more research should be done—suggests that the government can indeed help overcome collective action problems, both among U.S. firms and between business and others, such as consumers, who ultimately share many interests.

IMPLICATIONS FOR SDOS & PUBLIC POLICY

The deepening of the transatlantic marketplace and the further integration of the global economy are declared goals of governments on both sides of the Atlantic. Bilateral initiatives such as the Transatlantic Economic Partnership as well as joint leadership in multilateral fora such as the WTO underline that commitment. Business leaders in Germany and the U.S. support these goals, and are organized transnationally, for instance in the Transatlantic Business Dialogue (TABD), to support and influence transatlantic policymaking. As increased transatlantic commerce in a low-tariff environment has raised the prominence of conflicts over standards, public and private fora for transatlantic cooperation should directly address issues of standards and standards setting to ensure the predominance of cooperation.[97]

Standards developing organizations and public policy should focus on the commercial and political pressures to which the work of the main international standardization bodies are increasingly subjected. As two of the largest players in these organizations, Germany and U.S.—and their respective SDOs—bear a special responsibility to provide adequate leadership so that ISO and IEC can fulfill their respective missions. Effective transatlantic cooperation and joint leadership in ISO and IEC is hampered by the fact that Germany (in its wider European context) and the U.S. differ fundamentally in their approach to standardization. A resolution of these differences appears unlikely, but a number of practical steps can be taken to improve satisfaction on both sides and consequently transatlantic cooperation in international standardization.[98]

Policy Recommendations for the United States

- Establish/improve channels of communication for dissemination of information about standards work at the international level;

- Provide limited and targeted public support.

This study has confirmed that the fragmented institutional structure of U.S. standardization is detrimental to American interests in international standardization.

Fundamental change, especially the creation of a more effective national umbrella organization–to aggregate domestic preferences in a way that ensures a single national standard for any given product and an unambiguous American position at the international level–would be difficult and in the short run probably impossible, since the current arrangement is underpinned not just by political-economic and cultural traditions but also by the material interests of many U.S. SDOs. Yet, both SDOs and policymakers can take a number of smaller steps to improve the U.S. position in international standardization.

As more and more standards projects are handled at the international level, domestic standards institutions need to shift at least parts of their work programs away from national standards projects towards facilitating the effective participation of domestic stakeholders in international standards projects. Information collection at the international level and dissemination to affected firms and others at the domestic level is one of the key tasks national representatives in international standardization must accomplish in this context. Yet, as this study has shown, the institutional fragmentation of the U.S. seriously impedes the flow of information. ANSI can play an important role in overcoming this problem in ways that do not fundamentally threaten the interests of the many competing American SDOs. With the help of electronic communication, ANSI should be able to build up quickly and at relatively low cost direct channels of communication from those who participate in ISO meetings (nominally on ANSI's behalf!) to ANSI, and onward from ANSI to all firms in the affected industry or product group, regardless of whether the firm(s) belong to any particular industry association, participate in a particular domestic SDO, etc. Although some domestic SDOs might prefer to treat such information as assets, which they offer to member firms as one of the benefits of membership, the establishment of such a system for information dissemination should be only minimally threatening, since it leaves untouched the autonomy of SDOs for standards setting purposes–particularly if this information dissemination were to be done not just nominally but actually by ANSI, which itself is not a standards developer.

Recognizing the public interest in standardization matters, American policymakers should also consider limited and targeted public support for standardization activities. The establishment and operation of the channels of communication sketched above would surely warrant some public support, which should be desirable to U.S. business and other interests–and acceptable to U.S. SDOs, as long as it goes to ANSI and thus does not involve picking winners among the competing domestic SDOs. Two other aspects of international standardization warrant public support: 1) the additional costs incurred by firms due to participation in international rather than domestic standardization, and 2) the participation of non-commercial participants in national mirror committees. Participation in international standardization leads to higher travel costs and potentially higher costs of accommodations. In recognition of the contribution of standardization to public welfare and/or in order to level the playing field–since some foreign governments help pay their firms' representatives' travel expenses for standardization work–U.S. policymakers should consider offering some public support to those carrying out the work (firms would still be required to donate their employees' time and pay other costs of participation).

As governmental regulatory competences are increasingly delegated implicitly or even explicitly to private-sector standards developing organizations at the domestic and increasingly at the international level, the legitimacy of the resulting quasi-self-regulation requires close attention, both in the public interest and to avoid a later populist regulatory backlash. Our research suggests that the legitimacy of a standards developing process is to a large extent a function of the transparency of the process and its openness to input from consumers and other groups who have a stake in the technical specification of the standard. This raises doubts about treating the ability and willingness to pay as the appropriate test for genuine stakeholder status. At least for international standardization, public support is warranted in the United States (as it already exists in Germany and other European countries) to enable the participation of non-commercial stakeholders in the deliberations of national mirror committees ("Technical Advisory Groups" in the United States).[99]

Policy Recommendations for Germany/Europe

- Prioritize international standardization over regional standardization.

The current fit between German domestic and international standardization institutions works very well for German stakeholders. Nonetheless, German public policy and DIN can take steps to ensure both the continued satisfaction of German stakeholders with technical standards as standardization moves increasingly to the international level and the legitimacy and hence viability of the international non-governmental standardization system. Specifically, DIN and German stakeholders should push for standards work to take place primarily at the international rather than the European level whenever possible. Prior harmonization at the European level leads to a common European position in international standardization. This outcome might be strategically attractive in the short run. In the long run, however, the strategic formulation of a common European position risks undermining the legitimacy of international standardization, because it would lead to European block voting. This would unnecessarily increase the likelihood of transatlantic conflicts over standards and reduce the attractiveness of ISO and IEC standards for developing countries, many of which increasingly adopt these international standards instead of developing separate national standards.

Domestically, DIN faces a common complaint from German firms that it is not responsive enough to the needs of industry.[100] Pushing further ahead with the introduction of online technical databases and ensuring German standards experts' familiarity with ISO/IEC rules and procedures through DIN training services could enhance the usefulness of DIN to German industry.

Policy Recommendations for International Standards Developing Organizations

The World Standards Cooperation (WSC), founded in 2001 by the ISO, IEC, and ITU, is a key vehicle to improve cooperation between these three bodies and to make international standardization work more efficient by sharing information, avoiding duplication of work, and resolving contentious issues in technical cooperation between these three bodies.[101] The work program of the WSC should be expanded to include working groups to foster institutionalized learning about best (and worst) practices in standardization (e.g. in the introduction of information and communications technology to reduce the time and costs of travel for physical meetings) and to explore common asset utilization among the ISO, IEC and ITU (such as a common online database).

REFERENCES

Abbott, Kenneth W. and Duncan Snidal. 2001. "International 'Standard' and International Governance." *Journal of European Public Policy* vol.8 no.3 (Special Issue: Governance and International Standards Setting; Walter Mattli, ed.): 345-370.

Adams, Comfort A. 1919. "Industrial Standardization." *Annals of the American Academy of Political and Social Science* vol.82 ("Industries in Readjustment," edited by Clyde L. King).

American National Standards Institute (ANSI). 1996. *American Access to the European Standardization Process*. New York: ANSI.

Anton, James and Dennis Yao. 1995. "Standards-Setting Consortia, Antitrust, and High-Technology Industries." *Antitrust Law Journal* vol.64 no.1 (Fall 1995): 247-263.

Areeda, Phillip, Donald F. Turner, and Herbert Hovenkamp. 2002. *Antitrust Law: An Analysis of Antitrust Principles and their Application*. Boston: Aspen Publishers Inc.

Austin, Marc and Helen Milner. 2001. "Strategies of European Standardization." *Journal of European Public Policy* vol.8 no.3 (Special Issue: Governance and International Standards Setting; Walter Mattli, ed.): 411-431.

Backherms, Johannes. 1978. *Das DIN, Deutsches Institut für Normung e.V. als Beliehener* (Schriften zum Wirtschafts-, Handels, und Industrierecht, Nr.22). Cologne: Carl Heymanns Verlag.

Bahke, Thorsten. 2002. "Normen und ihre Wirkung in Wirtschaft und Gesellschaft." In *Normen und Wettbewerb*, edited by Thorsten Bahke, U. Blum, and Gisela Eickhoff. Berlin: Beuth Verlag, 2002: 51-66.

Bahke, Thorsten, U. Blum, and Gisela Eickhoff, eds. 2002. *Normen und Wettbewerb*. Berlin: Beuth Verlag.

Bartsch, Michael. 1987. *Das DIN, Deutsches Institut für Normung e.V., als marktbeherrschendes Unternehmen i. S. v. Paragraph 22 GWB*. Dissertation, Rechtswissenschaftliche Fakultät, Westfälische Wilhelms-Universität zu Münster, Münster.

Basi, Raghbir S. 1963. *Determinants of United States Private Direct Investments in Foreign Countries*. Kent: Kent State University Bureau of Economic and Business Research.

Benedick, Richard Elliot. 1991. *Ozone Diplomacy: New Directions in Safeguarding the Planet*. Cambridge: Harvard University Press.

Bensel, Richard Franklin. 2000. *The Political Economy of American Industrialization, 1877-1900*. New York: Cambridge University Press.

Berg, Sanford V. 1989. "The Production of Compatibility: Technical Standards as Collective Goods." *Kyklos: Internationale Zeitschrift für Sozialwissenschaften* vol.42 no.3: 361-383.

Bernstein, Marver H. 1953. "Political Ideas of Selected American Business Journals." *Public Opinion Quarterly* vol.17 no.2 (Summer 1953): 258-267.

Besen, Stanley and Joseph Farrell. 1994. "Choosing How to Compete: Strategies and Tactics in Standardization." *Journal of Economic Perspectives* vol.8 no.2 (Spring 1994): 117-131.

Brady, Robert. 1929. *Industrial Standardization*. New York: National Industrial Conference Board.

Braithwaite, John and Peter Drahos, eds. 2000. *Global Business Regulation*. New York: Cambridge University Press.

Breyer, Stephen G. 1982. *Regulation and Its Reform*. Cambridge, MA: Harvard University Press.

Brickman, Ronald, Sheila Jasanoff, and Thomas Ilgen, eds. 1985. *Controlling Chemicals: The Politics of Regulation in Europe and the United States*. Ithaca, NY: Cornell University Press.

Brunsson, Nils and Bengt Jacobsson. 2000. "The Contemporary Expansion of Standardization." In *A World of Standards*, edited by Nils Brunsson and Bengt Jacobsson. New York: Oxford University Press, 2000: 1-17.

Büthe, Tim. 2002. *The Political Sources of Business Confidence: The Impact of Partisan Politics, Globalization, and Institutional Variation on the Economic Expectations of Firms in Advanced Capitalist Democracies*. Ph.D. Dissertation. Political Science, Columbia University, New York.

Cahan, David. 1992. *Meister der Messung: Die Physikalisch-Technische Reichsanstalt*. Braunschweig: PTB.

Calleo, David. 1978. *The German Problem Reconsidered: Germany and the World Order, 1870 to the Present*. New York: Cambridge University Press.

Carhart, Henry S. 1900. "The Imperial Physico-Technical Institution in Charlottenburg." *Science* vol.12 no.306 (9 November 1900): 697-708.

Carlton, Dennis W. and J. Mark Klamer. 1983. "The Need for Coordination Among Firms, with Special Reference to Network Industries." *University of Chicago Law Review* vol.50 no.2 (Spring 1983): 446-465.

Casella, Alesandra. 2001. "Product Standards and International Trade: Harmonization through Private Coalitions?" *Kyklos: Internationale Zeitschrift für Sozialwissenschaften* vol.54 no.2-3: 243-264.

CEN. 2002a. *Directives and Related Standards*. Brussels: CEN.

---. 2002b. *European Standardization in a European Context*. Brussels: CEN.

CEN/CENELEC. 1984. *Allgemeine Leitsätze für die Zusammenarbeit zwischen der Kommission der Europäischen Gemeinschaften und der Europäischen Freihandelszone und den europäischen Normungsorganisationen* (CEN/CENELEC Memorandum 4). Brussels: CEN/CENELEC.

CENELEC. 2002. *Primer on Standards: Uncovering the Mysteries of Standardization in Europe*. Brussels: CENELEC.

Chandler, Alfred Dupont. 1977. *The Visible Hand: The Managerial Revolution in American Business*. Cambridge, MA: Belknap Press.

---. 1980. "Government Versus Business: An American Phenomenon." In *Business and Public Policy*, edited by John T. Dunlop. Boston: Harvard Business School Press, 1980: 1-11.

Cheit, Ross E. 1990. *Setting Safety Standards: Regulation in the Public and Private Sectors*. Berkeley: University of California Press.

Coase, R. H. 1937. "The Nature of the Firm." *Economica* vol.4 no.16 (November 1937): 386-405.

---. 1994. "The Institutional Structure of Production." In *Essays on Economics and Economists*. (Delivered as the Alfred Nobel Memorial Prize Lecture in Economic Sciences, Stockholm, 9 December 1991.). Chicago: University of Chicago Press, 1994: 3-14.

Cochrane, Rexmond. 1966. *Measures for Progress: A History of the National Bureau of Standards.* Washington, D.C.: National Bureau of Standards.

Congressional Research Service, Science Policy Division. 1974. *Voluntary Industry Standards in the United States: An Overview of their Evolution and Significance.* Washington, D.C.: Report to the Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics, U.S. House, 93rd Congress, 2nd Session, July 1974.

Cooke, Patrick W. 1988. *A Review of U.S. Participation in International Standards Activities.* Washington D.C.: U.S. Department of Commerce, National Bureau of Standards.

Council of the European Union. 1992. *Funktion der europäischen Normung in der europäischen Wirtschaft: Entschließung des Rates vom 9. Juli 1992.* Brussels: European Union (Amtsblatt Nr. C 173 vom 09/97/1992).

---. 1999. "Council Resolution of 28 October 1999 on the Role of Standardization in Europe." *Official Journal of the European Communities* (1999): C141.

David, Paul and Edward Steinmueller. 1994. "Economics of Compatibility Standards and Competition in Telecommunication Networks." *Information Economics and Policy* vol.6 no.3-4 (December 1994, special issue 'The Economics of Standards,' edited by Cristiano Antonelli): 217-241.

de Vries, Henk J. 1999. *Standards for the Nation: Analysis of National Standardization Organizations.* Boston/Dordrecht/London: Kluwer Academic Publishers.

Deutscher Normenausschuß, ed. 1927. *DIN 1917-1927*. Berlin: Beuth Verlag.

DiBernardo, Mary Jo, Belinda L. Collins, and Walter G. Leight, eds. 2002. *Standards in the Global Economy: Past, Present and Future* (Prodeedings of the NIST Centennial Standards Symposium). Gaithersburg, MD: National Institute of Standards and Technology.

DIN (Deutsches Institut für Normung) et al. 2000. *Gesamtwirtschaftlicher Nutzen der Normung, Zusammenfassung der Ergebnisse: Wissenschaftlicher Endbericht mit Praktischen Beispielen.* Berlin: Beuth Verlag.

---. 2001. *Grundlagen der Normungsarbeit des DIN* (DIN Normenheft 10). Berlin: Beuth Verlag.

Ebert-Kern, Beate. 1994. *Ökonomische und rechtliche Auswirkungen technischer Harmonisierungskonzepte im europäischen Normungssystem.* Frankfurt am Main: Peter Lang.

Egan, Michelle. 1997. *Bandwagon or Barriers? The Role of Standards in the European and American Marketplace.* Pittsburgh: University of Pittsburgh, European Union Center, Working Paper #1.

---. 2001. *Constructing a European Market: Standards, Regulation, and Governance.* New York: Oxford University Press.

Eickhoff, Gisela and Bernd Hartlieb. 2002a. "Einfluss auf Normen-Inhalte: Nationaler Fokus." In *Normen und Wettbewerb*, edited by Thorsten Bahke, U. Blum, and Gisela Eickhoff. Berlin: Beuth Verlag, 2002a: 78-94.

---. 2002b. "Einfluss auf Normen-Inhalte: Europäischer und internationaler Fokus." In *Normen und Wettbewerb*, edited by Thorsten Bahke, U. Blum, and Gisela Eickhoff. Berlin: Beuth Verlag, 2002b: 172-188.

Epstein, David and Sharyn O'Halloran. 1996. "The Partisan Paradox and the U.S. Tariff." *International Organization* vol.50 no.2 (Spring 1996): 301-324.

European Commission. 1998. *On the Conditions for Acceptance and Use of International Standards in the Context of the WTO Technical Bariers to Trade Agreement.* Brussels: European Community.

---. 1999. *Community External Trade Policy in the Field of Standards and Conformity Assessment*. Brussels.

Falke, Josef. 2000. *Rechtliche Aspekte der Normung in den EG-Mitgliedstaaten und der EFTA*: *Band 3, Deutschland*. Luxemburg: Amt für amtliche Veröffentlichungen der Europäischen Gemeinschaften.

Farrell, Joseph and Garth Saloner. 1986. "Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation." *American Economic Review* vol.76 no.5 (December 1986): 940-955.

Foner, Eric. 1984. "Why Is There No Socialism?" *History Workshop* (Oxford) no.17 (Spring 1984).

---. 1998. *The Story of American Freedom*. New York: W. W. Norton.

Friers, Günter. 2002. "Der Staat als Nutzer und Gestalter der Normung." In *Normen und Wettbewerb*, edited by Thorsten Bahke, U. Blum, and Gisela Eickhoff. Berlin: Beuth Verlag, 2002: 227-237.

Frost, Ellen L. 1998. *The Transatlantic Economic Parnership*, (Institute for International Economics Policy Brief no.6/1998).

Gardner, Brian. 1961. *The Big Push: A Portrait of the Battle of the Somme*. 3rd edition. London: Cassell.

Gerschenkron, Alexander. 1943. *Bread and Democracy in Germany*. Berkeley: University of California Press.

Gilpin, Robert. 1987. *The Political Economy of International Relations*. Princeton: Princeton University Press.

Glie, Rowen, ed. 1972. *Speaking of Standards*. Boston: Cahner Books.

Goldstein, Judith. 1989. "The Impact of Ideas on Trade Policy: The Origins of U.S. Agricultural and Manufacturing Policies." *International Organization* vol.43 no.1 (Winter 1989): 31-71.

Gourevitch, Peter A. 1977. "International Trade, Domestic Coalitions, and Liberty: Comparative Responses to the Crisis of 1873-1896." *Journal of Interdisciplinary History* vol.8 no.2 (Autumn 1977): 281-313.

---. 2003. "Corporate Governance: Global Markets, National Politics." In *Governance in a Global Economy: Political Authority in Transition*, edited by Miles Kahler and David A. Lake. Princeton: Princeton University Press, 2003: 305-331.

Grieco, Joseph M. and G. John Ikenberry. 2002. *State Power and World Markets: The International Political Economy*. New York: W. W. Norton.

Hahn, Hans-Werner. 1984. *Geschichte des deutschen Zollvereins*. Göttingen: Vandenhoeck & Ruprecht.

Hall, Peter A. and David Soskice. 2001. "An Introduction to Varieties of Capitalism." In *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*, edited by Peter A. Hall and David Soskice. New York: Oxford University Press, 2001: 1-68.

Hamilton, Robert W. 1978. "The Role of Nongovernmental Standards in the Development of Mandatory Federal Standards Affecting Safety or Health." *Texas Law Review* vol.56 no.8 (November 1978): 1329-1484.

Hanson, Gordon H., Raymond J. Mataloni Jr., and Matthew J. Slaughter. 2002. *Vertical Specialization in Multinational Firms*. Mimeograph, UC San Diego.

Hartz, Louis. 1991. *The Liberal Tradition in America: An Interpretation of American Political Thought since the Revolution*. (First published in 1955.). San Diego: Harcourt Brace & Company.

Hawkins, Richard W., Robin Mansell, and Jim Skea, eds. 1995. *Standards, Innovation and Competitiveness: The Politics and Economics of Standards in Natural and Technical Environments*. Aldershot, UK: Edward Elgar.

Hawley, Ellis W. 1995. *The New Deal and the Problem of Monopoly: A Study in Economic Ambivalence*. New York: Fordham University Press.

Hayek, F. A. 1994. *The Road to Serfdom*. Reprint, with a new introduction by Milton Friedman (First published in 1944). Chicago: University of Chicago Press.

Helpman, Elhanan and Paul R. Krugman. 1985. *Market Structure and Foreign Trade: Increasing Returns, Imperfect Competition, and the International Economy*. Cambridge, MA: MIT Press.

Hemenway, David. 1975. *Industrywide Voluntary Product Standards*. Cambridge, MA: Ballinger Publishing Co.

Himmelberg, Robert F. 1993. *The Origins of the National Recovery Administration: Business, Government, and the Trade Association Issue*, 1921-1933. New York: Fordham University Press.

Hirschman, Albert O. 1970. *Exit, Voice, And Loyalty: Responses to Decline in Firms, Organizations, and States*. Cambridge, MA: Harvard University Press.

Holborn, Hajo. 1969. "The Founding of the New German Empire, 1865-1871." In *A History of Modern Germany, 1840-1945*, edited by Hajo Holborn. Princeton: Princeton University Press, 1969: 173-229.

Holm, Bruno. 1967. 1917-1967: *Fünfzig Jahre Deutscher Normenausschuß*. Berlin: Beuth Verlag.

Holmes, Peter and Alasdair R. Young. 2001. *Emerging Regulatory Challenges to the EU's External Economic Relations*. Sussex: Sussex European Institute, Working Paper Series no.42.

Hummels, David. 1999. *Have International Transport Costs Declined*? Unpublished Manuscript, University of Chicago, November 1999.

---. 2001. *Time as a Trade Barrier*. Unpublished Manuscript, Purdue University, July 2001.

IHK, Industrie- und Handelskammer zu Berlin, ed. 1928. *Die Bedeutung der Rationalisierung für das deutsche Wirtschaftsleben*. Berlin: G. Stilke.

ISO. 2001. *ISO Directives Supplement: Procedures Specific to ISO*. Geneva: ISO.

ISO Japanese Delegation. 2000. "Proposals Concerning the Vienna Agreement." Mimeograph: Geneva.

ISO/IEC. 1996. *Standardization and Related Activities: General Vocabulary*. 7th edition. Geneva: ISO.

Katzenstein, Peter J. 1985. *Small States in World Markets*. Ithaca, NY: Cornell University Press.

---. 1987. *Policy and Politics in West Germany: The Growth of a Semisovereign State*. Philadelphia: Temple University Press.

Katznelson, Ira. 1996. *Liberalism's Crooked Circle*. Princeton: Princeton University Press.

Katznelson, Ira and Martin Shefter, eds. 2002. *Shaped by War and Trade: International Influences on American Political Development*. Princeton: Princeton University Press.

Katznelson, Ira and Aristide R. Zolberg, eds. 1986. *Working-Class Formation: Nineteenth-Century Patterns in Western Europe and the United States*. Princeton: Princeton University Press.

Keating, Barry P. 1981. "Standards: Implicit, Explicit and Mandatory." *Economic Inquiry* vol.19 no.3 (July 1981): 449-458.

Keohane, Robert O. 1984. *After Hegemony: Cooperation and Discord in the World Political Economy*. Princeton: Princeton University Press.

Kindleberger, Charles. 1983. "Standards as Public, Collective and Private Goods." *Kyklos: Internationale Zeitschrift für Sozialwissenschaften* vol.36 no.3: 377-396.

Klein, Martin. 1957. *Die deutsche Normung, 1917-1957*. Berlin: Beuth Verlag.

Krooss, Herman E. 1970. *Executive Opinion: What Business Leaders Said and Thought on Economic Issues, 1920s-1960s*. Garden City, NY: Doubleday.

Lake, David A. 1988. "The State and American Trade Strategy in the Pre-Hegemonic Era." In *The State and American Foreign Economic Policy,* edited by G. John Ikenberry et al. (Special Issue (vol.42 no.1; Winter 1988) of *International Organization*)1988: 33-58.

Lehmbruch, Gerhard. 2000. *The Institutionalization of 'Embedded Capitalism': The German 'Model' and its Impact on Japan*. Universität Konstanz (www.uni-konstanz.de/FuF/Verwiss/Lehmbruch/Veroeffentlichung/Capitalism.rtf).

Levitt, Theodore. 1968. "Why Business Always Loses." *Harvard Business Review* vol.46 no.2 (March-April 1968): 81-89.

Lipset, Seymour Martin and Gary Marks. 2000. *It Didn't Happen Here: Why Socialism Failed in the United States*. New York: W. W. Norton.

Loya, Thomas and John Boli. 1999. "Standardization in the World Polity: Technical Rationality over Power." In *Constructing World Culture: International Non-Governmental Organizations since 1875*, edited by John Boli and George Thomas. Stanford, CA: Stanford University Press, 1999.

Lundqvist, Lennart J. 1980. *The Hare and the Tortoise: Clean Air Policies in the United States and Sweden*. Ann Arbor: University of Michigan Press.

Mallett, Robert L. 1998-99. "Why Standards Matter." *Issues in Science and Technology* vol.15 no.2 (Winter 1998-99): 63-66.

Markovits, Andrei S. 1982. *Modell Deutschland: The Political Economy of West Germany*. New York: Praeger.

Marshall, Alfred. 1919. *Industry and Trade: A Study in Industrial Technique and Business Organization; and their Influence on the Conditions of Various Classes and Nations*. London: Macmillan and Co.

Martino, Robert Anthony. 1941. *Standardization Activities of National Technical and Trade Organizations.* (National Bureau of Standards miscellaneous publication M169; issued 28 November 1941.) Washington, D.C.: U.S. Government Printing Office for U.S. Dept. of Commerce.

Mattli, Walter. 2003. "Public and Private Governance in Setting International Standards." In *Governance in a Global Economy: Political Authority in Transformation*, edited by Miles Kahler and David A. Lake. Princeton: Princeton University Press, 2003: 197-229.

Mattli, Walter and Tim Büthe. 2003. "Setting International Standards: Technological Rationality or Primacy of Power?" *World Politics* vol.56 no.1 (October 2003): 1-41.

Matutes, Carmen and Pierre Regibeau. 1996. "A Selective Review of the Economics of Standardization Entry Deterrence, Technolgical Progress and International Competition." *European Journal of Political Economy* vol.12 no.2 (September 1996, special issue on "The Economics of Standardization," edited by Manfred J. Holler and Jacques-François Thisse): 183-209.

Milek, John T. 1972. "The Role of Management in Company Standardization." In *Speaking of Standards*, edited by Rowen Glie. Boston: Cahner Books, 1972: 129-144.

Nader, Ralph. 1965. *Unsafe at Any Speed: The Designed-In Dangers of the American Automobile*. New York: Grossman.

Nesmith, Achsah. 1985. "A Long, Arduous March toward Standardization." *Smithonian Magazine* vol.15 no.3 (March 1985): 176-189.

Nicolaïdis, Kalypso. 1997. *Mutual Recognition of Regulatory Regimes: Some Lessons and Prospects*. Fiesole: European University Institute, Jean Monnet Working Paper.

Nicolaïdis, Kalypso and Michelle Egan. 2001. "Transnational Market Governance and Regional Policy Externality: Why Recognize Foreign Standards." *Journal of European Public Policy* vol.8 no.3 (Special Issues: Governance and International Standards Setting; Walter Mattli, ed.): 454-473.

Nicolas, Florence and Jacques Repussard. 1994. *Gemeinsame Normen für die Unternehmen*. Luxemburg: Amt für amtliche Veröffentlichungen der Europäischen Gemeinschaften.

NIST (National Institute of Standards and Technology). 1997. *Standards Setting in the European Union*. Washington, DC: National Institute of Standards and Technology.

Noble, David F. 1977. *America by Design: Science, Technology, and the Rise of Corporate Capitalism*. New York: Alfred A. Knopf.

Opala. 1969. "The Anatomy of Private Standards-Making Process: The Operating Procedures of the USA Standards Institute." *Oklahoma Law Review* vol.22 no.1 (February 1969): 45-68.

Ordover, Janusz A., Alan O. Sykes, and Robert D. Willig. 1985. "Non-Price Anticompetitive Practices By Dominant Firms Toward the Producers of Complementary Products." In *Antitrust and Regulation: Essays in Memory of John J. McGowan*, edited by Franklin M. Fisher. Cambridge, MA: MIT Press, 1985: 115-130.

OTA, Office of Technology Assessment of the Congress of the United States. 1992. *Global Standards: Building Blocks for the Future*. Washington D.C.: Government Printing Office.

Parnell, Martin. 1994. *The German Tradition of Organized Capitalism*. New York: Oxfort University Press.

Paterson, William E. and Gordon Smith. 1981. *The West German Model: Perspectives on a Stable State*. London: Cass.

Pritchett, Henry S. 1902. "The Story of the Establishment of the National Bureau of Standards." *Science* vol.15 no.383 (21 February 1902): 281-284.

Puhle, J. J. 1984. "Das historische Konzept des entwickelten Industriekapitalismus: 'Organisierter Kapitalismus' und 'Korporatismus'." *Geschichte und Gesellschaft* vol.2: 165-184.

Quinlan, Joseph P. 2003. *Drifting Apart or Growing Together? The Primacy of the Transatlantic Economy*. Washington D.C.: Center for Transatlantic Relations.

Quinn, Dennis P. and Robert Y. Shapiro. 1991. "Business Political Power: The Case of Taxation." *American Political Science Review* vol.85 no.3 (September 1991): 851-874.

Salter, Liora. 1988. *Mandated Science: Science and Scientists in the Making of Standards*. Dordrecht: Kluwer Academic Publishers.

---. 1999. "The Standards Regime for Communication and Information Technologies." In *Private Authority and International Affairs*, edited by A. Claire Cutler, Virginia Haufler, and Tony Porter. Albany, NY: State University of New York Press, 1999: 97-127.

Sandel, Michael, ed. 1984. *Liberalism and Its Critics*. New York: New York University Press.

Schmidt, Manfred G. 1987. "West Germany: The Politics of the Middle Way." *Journal of Public Policy* vol.7 no.2: 139-177.
---. 2001. "Still on the Middle Way? Germany's Political Economy at the Beginning of the Twenty-First Century." *German Politics* vol.10 no.3: 1-12.

Shklar, Judith N. 1998. *Redeeming American Political Thought*. Edited by Stanley Hofmann and Dennis F. Thompson. Chicago: University of Chicago Press.

Smith, Mark A. 2000. *American Business and Political Power: Public Opinion, Elections, and Democracy*. Chicago: University of Chicago Press.

Stadler, Gerrit. 2002. *Die Beleihung in der neueren Bundesgesetzgebung*. Hamburg: Verlag Dr. Kovac.

Stigler, George J. 1971. "The Theory of Economic Regulation." *Bell Journal of Economics and Management Science* vol.2 no.1 (Spring 1971): 3-21.

---. 1975. *The Citizen and the State: Essays on Regulation*. Chicago: University of Chicago Press.

Stigler, George J. and Claire Friedland. 1962. "What Can Regulators Regulate? The Case of Electricity." *Journal of Law and Economics* vol.5 no.1 (October 1962): 1-16.

Sutton, Francis Xavier, et al. 1956. *The American Business Creed*. Cambridge, MA: Harvard University Press.

Swann, G. M. Peter. 2000. *The Economics of Standardization: Final Report for Standards and Technical Regulations Directorate, Department of Trade and Industry*. Manchester: Manchester Business School Report.

Tate, Jay. 2001. "National Varieties of Standardization." In *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*, edited by Peter A. Hall and David Soskice. New York: Oxford University Press, 2001: 442-473.

Toth, Robert B., ed. 1996. *Standards Activities of Organizations in the United States*. Washington, D.C.: U.S. Government Printing Office for the U.S. Dept. of Commerce, Technology Administration, National Institute of Standards and Technology.

U.S. House of Representatives Science Committee, Subcommittee on Environment, Technology and Standards. 2001. Hearing: *Standards-Setting and United States Competitiveness*, 28 June 2001. Washington D.C.: U.S. Government Printing Office.

Vogel, David. 1978. "Why Businessmen Distrust Their State: The Political Consciousness of American Corporate Executives." *British Journal of Political Science* vol.8 no.1 (January 1978): 45-78.

---. 1989. *Fluctuating Fortunes: Political Power of Business in America*. New York: Basic Books.

---. 1996. *Kindred Strangers: The Uneasy Relationship Between Politics and Business in America*. Princeton: Princeton University Press.

---. 2003. “The Hare and the Tortoise Revisited: The New Politics of Consumer and Environmental Regulation in Europe.” *British Journal of Political Science* vol.33 no.4 (October 2003): 557-580.

Walsh, Annemarie Hauch. 1978. *The Public's Business: The Politics and Practices of Government Corporations*. Cambridge, MA: MIT Press.

Williamson, Oliver E. 1985. *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*. New York: The Free Press.

Wilson, John S. and Victor O. Abiola, eds. 2003. *Standards and Global Trade: A Voice for Africa*. Washington, DC: The World Bank.

Winkler, Heinrich A., ed. 1974. *Organisierter Kapitalismus: Voraussetzungen und Anfänge*. Göttingen: Vandenhoeck und Ruprecht.

Wölker, Thomas. 1992. *Die Entstehung und Entwicklung des Deutschen Normenausschusses, 1917-1925*. Berlin: Beuth Verlag.

---. 1993. “Der Wettlauf um die Verbreitung nationaler Normen im Ausland nach dem ersten Weltkrieg und die Gründung der ISA aus Sicht deutscher Quellen.” *Vierteljahresschrift für Sozial- und Wirtschaftsgeschichte* vol.80 no.4: 487-510.

WTO, World Trade Organization. 1998. *WTO Training Package: Module 3, Goods: Rules on NTMs*. 15 December 1998. Geneva: WTO Secretariat.

NOTES

1 The reported findings from recent research are based on, for technological development: Hawkins, Mansell, and Skea (1995), IHK (1928), and Marshall (1919); for overall economic benefits: DIN (Deutsches Institut für Normung) et al (2000); also chapters by Arnold, Joynt, Miner, and Woerter in Glie (1972) and Swann (2000); for standards as barriers to U.S. exports: Mallett (1998-99); for freight containers (Hummels 1999; 2001); and for standards and FDI, e.g., Wilson and Abiola (2003).

2 See Mattli and Büthe (2003).

3 On the importance of the process of setting standards see Mattli and Büthe (2003); on the problem of undersupply of standards, see Carlton and Klamer (1983), Casella (2001), Kindleberger (1983). Standards lack depletability because one firm's use of a standard for its products does not diminish the availability of that standard for use by another firm. Standards also exhibit non-excludability because, unless someone has an enforceable proprietary claim to a standard (e.g. a patent), it is difficult if not impossible to exclude users from adopting it. For goods such as open source software, this effect is in fact intended.

4 See ISO/IEC (1996).

5 WTO (1998:E3-2). For discussions of alternative ways of categorizing standards see Abbott and Snidal (2001); de Vries (1999), Mattli (2003), and Salter (1999).

6 In practice, hybrid forms also exist, such as standards consortia, which combine the first approach with elements of the third in an exclusive form of cooperation. For contrasting accounts of standards consortia, see the written testimony by Carl F. Cargill to the June 2001 U.S. House Science Committee Hearing (2001:114ff) versus Anton (1995). Regarding market-driven de facto standardization, see, e.g., Farrell and Saloner (1986), Besen and Farrell (1994), Matutes and Regibeau (1996), David and Steinmueller (1994), Berg (1989), and Ordover et al (1985). Regarding regulatory standards, see, e.g., Hamilton (1978), Breyer (1982), Braithwaite and Drahos (2000), Egan (2001), and Vogel (2003). Regarding the prevalence of standards setting through institutionalized cooperation, see, e.g., Hemenway (1975) and Toth (1996).

7 In some countries, most notably Japan, "the" national SDO is actually a government agency, though participants are primarily drawn from the private sector (Tate 2001:459-463).

8 "Consensus" differs from unanimity in that it only requires that objections are taken into account in revisions, withdrawn, rejected as lacking technical justification, or (in some cases) overruled by a large super-majority.

9 Hamilton (1978:1373). See also Casella (2001:262).

10 For the earlier critiques, see Nader (1965) and Opala (1969). Austin and Milner (2001) show that firms may still try to dominate institutionalized standards setting for competitive advantages. For a thorough theoretical treatment of institutional processes of standardization, see Mattli and Büthe (2003).

11 The German customs union (*Deutscher Zollverein*), created in 1834, was an important step towards economic and political integration, but proved unsuited as a mechanism to devise a common commercial policy (Hahn 1984). The Reichsanstalt was the first government agency of its kind in the industrialized world.

12 There is one notable exception: DIN shares the responsibility for developing and maintaining standards for electrotechnical products with the Association of German Electrotechnical Engineers ("Verband Deutscher Elektrotechniker," VDE). Together with the VDE, DIN has formed the German Electrotechnical Committee (Deutsche Kommission Elektrotechnik, DKE). The DKE also represents German standards interests in the European and international SDOs for electrotechnical products (CENELEC and IEC). However, standardization in the DKE still follows the rules and procedures laid down in the DIN charter. This special role for standardization of electrotechnical products is due to specific historical circumstances. For details, see Holm (1967) and Klein (1957).

13 For more information, see Backherms (1978:60) and Bahke (2002:53).

14 The DIN treaty is reproduced, inter alia in DIN (2001:37ff). DIN 820 is reproduced in DIN (2001:85-89).

15 For classic discussions of the role of the German state in industrialization, see Gerschenkron (1943), Holborn (1969), and Calleo (1978). On the notion of "coordinated capitalism" see Hall and Soskice (2001).

16 DIN's wartime roots are discussed in greater detail in Deutscher Normenausschuß (1927), Holm (1967), Klein (1957), and Wölker (1992). On industry's efforts on numerous occasions to constrain the increase of the government's role in standardization, see Tate (2001:452).

17 These long-term developments in the German political economy are discussed in greater detail e.g. in Lehmbruch (2000).

18 Katzenstein (1987:78). On organized capitalism, see Parnell (1994), Puhle (1984), Winkler (1974). On the "middle way" see Schmidt (1987; 2001). On "*Modell Deutschland*," see Markovits (1982) and Paterson (1981).

19 Katzenstein (1987:58).

20 While most "parapublic" institutions are incorporated under public law, this is not a necessity. In fact, as Katzenstein shows, there is a wide range of privately incorporated bodies that discharge important public functions (Katzenstein 1987:60).

21 In fact, as a result of privatization on the federal as well as the state level, this practice has gained renewed relevance in recent years.

22 Such a formalization of relations between the government and a standardization body is not unique and in most European countries had already taken place earlier.

23 Stakeholders that do not make financial contributions to the work of a standards committee can be excluded from that committee; see DIN (Deutsches Institut für Normung) et al (2001:513).

24 Note that individual membership contributions are based on the number of employees. As a result, large companies contribute a proportionately bigger portion of DIN's budget.

25 Currently, the presidium consists of 47 members, including the director and the president of DIN, 21 representatives of large German companies, and 8 representatives of German business associations. In contrast, only two consumer organizations (the "Technischer Überwachungsverein" (TÜV) and "Stiftung Warentest") send representatives to DIN's central decision-making body. The Swiss and Austrian SDOs are represented with one member each. The German government (including state and local level) has seven representatives on the presidium. Two representatives come from small- and medium-sized enterprises, one representative comes from a university.

26 Government contributions to DIN's budget come from various federal ministries as well as "*Länder*" governments. See Figure 2.1 (DIN Budget).

27 Note, however, that the number of purely German domestic standards, i.e., DIN standards that are not transposed European or international standards, has much decreased. Less than 20 percent of all standards published by DIN in 2002 were purely domestic standards; 80 percent were either identical with European or ISO/IEC standards, or both.

28 The number of standards committees varies over time and reflects the changing needs of German industry and other stakeholders. DIN staff administers 62 of these committees, industry associations manage 14.

29 A standards committee that develops basic standards (e.g., statistical standards, measurement standards, etc.) is likely to receive more direct support from DIN's core institutional budget. Other work items with more direct commercial relevance for business are usually funded primarily by voluntary industry contributions.

30 For detailed discussions of the DIN standardization process, see DIN et al (2001:85ff); Eickhoff and Hartlieb (2002a:78-81); and Bahke (2002:54f). The standardization process also features a dispute resolution mechanism; see DIN et al (2001). For a critique of the effectiveness of that mechanism see Backherms (1978:55). Falke (2000:141) observes that this dispute resolution mechanism is not widely used.

31 Product standards developed by ETSI are excluded.

32 For a thorough description and discussion of the European system, see CEN (2002a; 2002b), CENELEC (2002), Ebert-Kern (1994), Eickhoff and Hartlieb (2002b), Friers (2002), Nicolas and Repussard (1994), NIST (1997), ANSI (1996), and Egan (2001).

33 Note that the "old approach" to harmonization is still in effect in politically sensible product areas such as pharmaceuticals, foodstuffs, and aircraft equipment.

34 Between 1985 and 1992, almost 300 harmonization directives were issued by the European Commission and approved by the European Council, paving the way for the successful completion of the Single Market Programme by 1992. For practical yet comprehensive reviews of the New Approach see ANSI (1996), Egan (2001), and NIST (1997).

35 For CEN, see http://www.cenorm.be. For CENELEC, see http://www.cenelec.org. ETSI (the European Telecommunications Standards Institute, see http://www.etsi.org) is the third recognized European standardization organization, developing standards for information and telecommunications products, which are beyond the scope of this study. The underlying principles of European standardization are very similar to those employed by DIN, with two important exceptions: First, stakeholders are not directly represented on European standards committees. Representation is organized through national delegations that are elected in national "mirror committees." These delegations have to present a unified national standpoint rather than their special interests. Second, CEN and CENELEC employ a different decisionmaking procedure. While the standardization process is consensus-based, the eventual adoption of a standard is confirmed through a voting procedure. To be adopted, a standard needs to garner at least 71 percent of the weighted votes, plus a simple majority of member states. For a more detailed discussion, see Eickhoff and Hartlieb (2002b).

36 As specified in the Guiding Principles for Cooperation between the E.C., EFTA and the European Standardization Organizations of 13 November 1984 (CEN/CENELEC 1984) and the Council Resolution of 18 June 1992 regarding the role of European standardization in the European economy (Council of the European Union 1992).

37 CEN (2002a) and CENELEC (2002).

38 Preparations for enlargement have been underway for the past decade, supported by generous financial assistance through EU programs such as PHARE and CARDS. Since 1989, the EU has funded extensive programs for Central and Eastern European countries as well as Turkey. Forecast of CEN standardization based on CEN (2002a:5).

39 During an interview, one CEN official complained that national member bodies were dominating the European market for third country assistance, shutting out the European standards organizations despite their qualifications (interview with CEN official, 13 March 2003, Brussels CEN secretariat).

40 For more detailed discussions of the early history of standardization in the U.S., see Carhart (1900), Pritchett (1902), Brady (1929), and Cochrane (1966: here esp. 20ff, 33ff, 38ff, 60f).

41 House Science Committee (2001:18). The key issue for which the 1904 fire is remembered is that most of the fire engine companies brought in to Baltimore from nearby towns and later even by special trains from Washington D.C., Philadelphia, New York, etc. were unable to help, since they found that the thread standard used in their home towns for hose-hydrant couplings differed from Baltimore's (and most of the 600+ others across the country). It nonetheless took decades for the national standard, developed in 1905, to be adopted throughout the United States (Cochrane 1966:84-86). Source of Figure 3.1 cartoon: American Standards Association, *Through History with Standards: An Illustrated Textbook*. New York: ASA, 1965.

42 For U.S.-European comparisons of the level and stringency of regulation, see Benedick (1991), Brickman, Jasanoff, and Ilgen (1985), Lundqvist (1980), and Vogel (2003). On U.S. business' fluctuating political fortunes, see Smith (2000) and Vogel (1989; 1996); on the increase in business lobbying, see Quinn and Shapiro (1991). On industry opposition to many regulatory proposals that ultimately benefited them, see e.g. Levitt (1968); on capture, see Stigler (1971; 1975) and Stigler and Friedland (1962). On the intellectual hegemony of an entrepreneurial and Protestant tradition à la Weber and the absence of organized labor as a political force in the U.S., see Foner (1984), Katznelson and Zolberg (1986), as well as Lipset and Marks (2000).

43 See in general Areeda, Turner, and Hovenkamp (2002) and specifically Chandler (1980). Note, however, the well-documented opposition to anti-trust among U.S. industry, notably since the 1920s, e.g., Himmelberg (1993) and Hawley (1995), and the recent loosening of various anti-trust provisions (e.g. Tate 2001:466f).

44 Quotes from OTA (1992:46). On U.S. industrial development, see Bensel (2000:esp. 124ff, 293ff, 457ff), Chandler (1977), Gourevitch (1977; 2003), Katznelson and Shefter (2002), and Lake (1988). On variations of tariff protection and their effect, see Epstein and O'Halloran (1996). It should be noted that the Supreme Court explicitly confirmed as early as 1877 (in Munn v. Illinois) the principle that "public interest" justifies state intervention in private industry (Bensel 2000:309). On business' anti-statism, see Bernstein (1953), Büthe (2002), Krooss (1970), Levitt (1968), Sutton et al (1956), and Vogel (1978). On its consequences and inconsistencies, see e.g. , Walsh (1978) and Goldstein (1989). On intra-firm coordination, see Coase (1937; 1994) and Williamson (1985). On liberalism as a political-economic philosophy, its tensions and American incarnations, see Foner (1998), Hartz (1991), Hayek (1994), Katznelson (1996), Sandel (1984), Shklar (1998). Note that in contemporary common American usage, "liberal" usually refers to the political Left and often specifically to those social policies that conflict with classic economic liberalism. On U.S. economic structures as the prototypical "liberal" market economy, see Hall and Soskice (2001:esp. 7f, 27ff).

45 Some SDOs are not exclusively of one type of another.

46 The payment of membership fees of the association, society, etc. is usually a prerequisite for participation. Industry associations may allow participation of representatives from pertinent government agencies to participate in their standardization activities without becoming members of the association.

47 OTA (1992:51).

48 Some analysts count among general membership SDOs also organizations that develop standards exclusively for a narrow range of products, as long as standardization is their predominant function (e.g., Toth 1996). One of the oldest and largest American private SDOs, U.S. Pharmacopoeia, founded in the 1820s, belongs in this group (OTA 1992:46f); it accepts individuals, firm, and other corporate entities as members and has the primary function of developing standards of "identity, strength, quality, purity, packaging, labeling, and storage for medicines and other health care products" (http://www.usp.org). Regarding NFPA, see Cheit (1990:28).

49 OTA (1992:50).

50 Note that more than 90 percent of the 2000+ professional and scientific societies in the U.S. are not currently standards developers (Toth 1996:4). On the key role of scientists in industrial standardization, see Brady (1929:esp. 61ff), Martino (1941), and Loya and Boli (1999).

51 Salter (1988:esp. 36ff).

52 For a brief overview of U.S. consortia standardization, see Toth (1996:5, 574). See also note 6. The argument that participants may retain institutional assets, once they have made the investments necessary for their creation, builds on Keohane (1984).

53 Tate (2001:464).

54 Assessment by the Congressional Office of Technology Assessment, OTA (1992:44, 46f, 57). The NBS established national standards for length, volume, mass, temperature, and light; nudged state and local governments toward the harmonization of standards in public spaces; developed many analytical methods and instruments to test characteristics of materials; and conducted a broad range of basic research that often was crucial for the subsequent development of industrial products. Ammunitions problems were particularly pronounced in the case of ammunition produced without clear standards by a multitude of U.S. manufacturers for European-made weaponry of allied British and French troops, but it was also experienced by U.S. troops with U.S. weaponry (e.g., Gardner 1961:162). These experiences motivated the fixation on procurement product standards by the Department of Defense. For more detailed historical discussion, see Cochrane (1966), DiBernardo, Collins, and Leight (2002), and Bensel (2000:esp. 298f). On the withdrawal of the U.S. government from industry-wide product standards, see Congressional Research Service (1974) and (Cochrane 1966:449). Both the Senate and the House have held hearings on standards-related issues in recent years. In the late 1980s/early 1990s, the Department of Commerce began to place "standards attachés" in the U.S. Embassies in Brussels (for the EU), Brazil, India, Mexico, and Saudi Arabia to convey information about U.S. standards and inform U.S. firms and standardizers about standards-related activities in those market.

55 For instance, federal, state, or local regulations require wiring to comply with the National Electrical Code developed by National Fire Protection Association–not to be confused with the National Electrical Safety Code, developed by IEEE, see Cheit (1990:28); beam spacing in construction to comply with building codes developed by various organizations at the national and local levels (Keating 1981); and boilers to comply with the National Boiler and Vessel Code developed by ASME (Nesmith 1985). Robert Hamilton (1978) pointed out the use of non-governmental standards in regulation already in the 1970, yet from 1991 to 1996 alone, the number of standards developed by non-governmental SDOs adopted by the federal government has grown from about 3,400 to about 8,000 (Toth 1996:2, 581ff). For current U.S. government policy on this issue, see the 1993 Office of Management and Budget Circular A-119, "Federal Participation in the Development and Use of Voluntary Standards" and section 12 of the 1995 "National Technology Transfer and Advancement Act." On hybrid public-private standardization, see Mattli (2003) and Salter (1999).

56 Milek (1972:142).

57 Text: http://public.ansi.org/ansionline/Documents/News%20and%20Publications/Brochures/national_strategy.pdf (accessed 1 August 2003). For a discussion, see DiBernardo, Collins and Leight, (2002).

58 For more detailed information on the history of AESC, ASA, and ANSI, see Adams (1919), Congressional Research Service (1974), Noble (1977:esp. 80f), OTA (1992:esp. 48ff), and http://www.ansi.org/about_ansi/introduction/history.aspx?menuid=1 (accessed 8 Nov 2003). Note that the "American National Standard" label only conveys information about the process by which the standard was developed; it does not indicate that this is the only or even necessarily predominant standard in use in the United States. A 1988 study estimated about 25 percent of U.S. non-governmental standards to be "American National Standards" (Cooke 1988). For more information on ANSI's international and regional activities, see http://www.ansi.org/standards_activities/international_programs/ipc.aspx?menuid=3 (accessed 1 August 2003).

59 Note, however, that the history of the IT sector is littered with examples of technologically superior hardware and software failing because an inferior but prior or market-dominant technology with network effects makes it individually irrational to switch to the better technology. This makes it questionable to claim that the co-existence of multiple standardizers for a given product leads in itself to technologically superior solutions.

60 For the text of the U.S.-EU agreement, see http://www.mac.doc.gov/mra/mra.htm (accessed 8 August 2003). For a discussion of the agreement, see European Commission (1999), Egan (1997), Holmes and Young (2001), Nicolaidis (1997), and Nicolaidis and Egan (2001). For the text of the WTO TBT-Agreement, see http://www.wto.org/english/docs_e/legal_e/17-tbt_e.htm (accessed 8 August 2003).

61 The International Telecommunications Union (http://www.itu.org) sets ICT standards. For a political economy analysis of ITU standards setting, see Krasner (1991). The Codex Alimentarius Commission (http://www.codexalimentarius.net, created in 1963 jointly by the WHO and FAO) develops food safety standards. The UN/ECE is the United Nations Economic Commission for Europe (http://unece.org).

62 For figures, see http://www.iso.ch/iso/en/aboutiso/isoinfigures/January2003-p2.html (accessed 23August 2003).

63 For a history of the creation of the ISA, with a specific emphasis on competing national interests, see Wölker (1993).

64 ISO Membership contributions are calculated according to GNP. IEC membership contributions are based on GNP as well as electricity use.

65 The standardization process in ISO proceeds through five stages [ISO/IEC, 2001 #4017:3-10]. Two stages feature a voting procedure: The "Enquiry Stage" and the "Approval Stage". During the Enquiry Stage, a Draft International Standard (DIS) is circulated to all national members of ISO for a five-month ballot. Approval of a DIS requires a two-thirds majority of members of the TC that drafted the standard, and a 75 percent majority of all votes cast. At the Approval Stage, the Final Draft International Standard (FDIS) is circulated to all national members bodies for a 2-month ballot. The FDIS is approved if at least two thirds of the committee members cast a positive vote, and less than 25 percent of all votes cast are negative.

66 That most countries' SDOs have no serious objections to most proposed new/revised standards is further corroborated by the finding that, on average, over these four years most members abstained in most cases.

67 The mission statement can be found at DIN's website: http://www2.din.de/sixcms/detail.php?id=1348 (accessed 24 August 2003).

68 For a more detailed treatment of the role of national committees, see Falke and Schepel (2000:140-149).

69 It seems reasonable to assume that participation in a national delegation should be highly attractive to German firms that want to influence international standardization. As a result, one should see considerable competition in that election process. In most cases, however, it is difficult to find industry representatives willing to carry the costs of international representation-usually more expensive than participation in national committees.

70 The Federal Ministry of Economics and Labor provides part of the membership contributions that DIN has to pay to ISO and IEC (DIN 2001:512).

71 Germany became an official member of ISO in 1951. As one ISO official commented during an interview: "It was the Europeans, and especially the Germans, who kept the shop [ISO] alive while the Americans did not show much interest over the past decades. Those who invest time and money into ISO procedures will also get results." Interview with ISO official conducted by Jan Martin Witte, Geneva, 4 March 2003.

72 In fact, German business was also one of the main backers of the newly created International Federation of Standards Associations (ISA) in 1926, and regarded this creation as an effort to bundle European influence against the rising commercial power and influence of the U.S. (Wölker 1993).

73 See standards production data in chapter 2.

74 Germany funds roughly 10 percent of ISO's core institutional budget according to an ISO official (interview conducted by Jan Martin Witte, 5 March 2003, ISO Central Secretariat, Geneva (Switzerland)).

75 This similarity in "philosophical" approach–also confirmed in interviews conducted by Jan Martin Witte–is reflected in the mission statements of DIN, ISO, and IEC (all of which can be accessed on their web sites).

76 Institutions are understood to be complementary "… if the presence (or efficiency) of one increases the returns from (or efficiency of) the other." (Hall and Soskice 2001:17).

77 Several interviewees noted that the EU exerted considerable pressure on ISO and IEC to agree to such cooperation agreements. They allege that the Europeans threatened ISO and IEC with a "walkout" from international standards projects in case specific European needs were not accommodated in ISO/IEC work.

78 IEC and CENELEC brokered the so-called "Dresden Agreement" that establishes a similar technical cooperation procedure (see CENELEC (2002); ANSI (1996); and Eickhoff and Hartlieb (2002b)). Today, 75 percent of CENELEC standards are identical to or based upon IEC standards (CENELEC 2002:25).

79 The Japanese delegation to ISO also disparaged the agreement as "not transparent," "lacking in openness," "difficult to understand" and, most importantly, "not impartial" (ISO Japanese Delegation 2000). As a result, the implementation of the agreement has been newly regulated in 2000. However, the basic substance of the agreement was not changed. See the ISO Guidelines for Implementation of the Vienna Agreement, reprinted in DIN (Deutsches Institut für Normung) et al (2001:467-476).

80 Even a U.S. Administration official declared that Europeans are not acting as a bloc in IEC and ISO. Instead, he argued that "… they are participating aggressively and assuming leadership positions in the organization." He characterized U.S. activities as "… more like a whisper … Clearly, it is time for us to re-establish our roots, to reassume our leadership role, to strengthen our voice." Interview with U.S. Deputy Under Secretary for Technology Gary Bachula (Electroindustry-NEMA 2000).

81 Data provided by ISO Central Secretariat.

82 See, e.g., European Commission (1998), Council-of-the-European-Union (1999: Theme 3, section 2b and 2c).

83 For a more extensive theoretical discussion of institutional complementarities between domestic and international organizations in the standards arena, see Mattli and Büthe (2003).

84 Cooke (1988: 21, 23).

85 Quinlan (2003:12-16, 25).

86 ANSI, of which many U.S. SDOs are not members, is institutionally too weak to fulfill many of these functions.

87 The International Standards Project, based at Columbia University and directed by Büthe and Mattli, is the first major comparative international scientific research project on product standards use and standardization in the U.S. and Europe. Its business survey is yielding a major database, which currently includes information on 866 U.S. and 181 German firm-level respondents in five industries (chemicals; iron and steel; medical instruments and devices; petroleum products; and rubber and plastics).

88 Given that the major international SDOs use elaborate consensus procedures when developing an international standard, the choice of equilibrium is largely a consequence of the extent to which firms from a given country get involved in international standards setting–and the extent to which national standards institutions are conducive to the participation of their domestic stakeholders in international standardization. Figures 5.2a and 5.2b again draw on the International Standards Project survey.

89 For recent general theoretical treatments of FDI see, for instance, Caves (1996), Blomström, Kokko, and Zejan (2000), Markusen and Maskus (2001), and Lipsey (2002). On vertical FDI, see also Helpman and Krugman (1985). None of these works discuss standards explicitly as a factor in foreign direct investment decisions, though case examples of non-tariff barriers to trade that were overcome through FDI often involve product standards (e.g. Graham and Krugman 1995:51ff). For the classic general discussions of why it may be desirable to maintain multiple stages of product development and manufacture and multiple production facilities under one ownership, see Coase (1937) and Williamson (1985). For discussions of the importance of predictability of the economic and political context, see, e.g., Jensen (2003), Schneider and Frey (1985), and U.N. (1992).

90 In practice, most FDI involves some mix of the two, and survey-based studies (beginning with Basi 1963) and research in international political economy have identified a number of motivations for FDI which might lead to forms of FDI that do not neatly fit either type–such as taking advantage of different tax regimes through transfer pricing (Hanson, Jr., and Slaughter 2002) and ensuring political influence through giving host countries a stake in the firm's well-being (Gilpin 1987; Grieco and Ikenberry 2002).

91 See Katzenstein (1985).

92 Various reports have highlighted the significance of compliance with international product standards for developing economies to attract FDI, such as Wilson and Abiola (2003), although there are no systematic international comparative studies. In advanced industrialized countries with small domestic markets, SIS, the national standards developing organization of Sweden, for instance, has, in recognition of the importance of international standards, switched entirely from developing Swedish standards (for decades its primary function) to orchestrating Swedish input into the regional and international standardization process. The resulting European and international standards are then adopted as Swedish standards without further changes.

93 See Mattli and Büthe (2003).

94 Brunsson and Jacobsson (2000:2).

95 Several DIN officials and company representatives have confirmed this declining willingness of firms to invest in voluntary product standardization in interviews conducted by Jan Martin Witte.

96 Currently, neither the U.S. Chamber of Commerce nor the Conference Board maintain any notable activities in this area. They also provide only very little or no information about international standards issues on their website (see http://www.uschamber.com/sb/P09/P09_3220.asp, accessed 24 August 2003). Other industry associations, such as for example the National Association of Manufacturers, have already worked for quite some time on issues related to international standardization. See for example http://www.nam.org/secondary.asp?TrackID=&CategoryID=1143 for more information (accessed 22 August 2003). Industry associations such as the National Electrical Manufacturers Association (NEMA) that also function as standards developers naturally maintain more extensive programs (see for example http://www.nema.org/index_nema.cfm/1427/, accessed 24 August 2003).

97 Launched by the EU and the U.S. in May 1998. For the text of the agreement see http://europa.eu.int/comm/trade/bilateral/usa/1109tep.htm (accessed 15 November 2003). For its history and an analysis see Frost (1998).

98 This should include, for example, joint transatlantic efforts to increase the efficiency and effectiveness of ISO and IEC. Both ISO and IEC have taken various measures in recent years to optimize their performance and to become more responsive to stakeholders' needs, see ISO (2003, (available for download at http://www.iso.org/iso/en/aboutiso/strategies/isostrategies2002-pocket_E.pdf, accessed 24 August 2003) and IEC (2000, available for download at http://www.iec.ch/news_centre/onlinepubs/pdf/masterplan.pdf, accessed 24 August 2003).

99 For examples of popular reaction, see for instance the strong opposition of groups like Public Citizen to the internationalization of regulatory and standards-setting functions.

100 See the results of the DIN survey on this issue (2000:19). In numerous interviews conducted by Jan Martin Witte, German firm representatives corroborated the results of DIN's industry survey.

101 For more background on the WSC, see the ITU's website at http://www.itu.int/ITU-T/tsag/tsagcoco-wsc/ (accessed 24 August 2003), as well as Bahke et al (2002).

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