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Uneven geographies of organizational practice: explaining the cross-national transfer and adoption of ISO 9000

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Abstract

There is growing recognition that organizational innovations can have a major influence on the geography of economic activity. Yet, very little is known about the mechanisms and geographic preconditions underlying their diffusion, particularly at the global level. In this paper we seek to fill this gap using the example of ISO 9000, the internationally-recognized set of standards for quality management. We develop a series of hypotheses about the conditions under which organizations are most likely to adopt ISO 9000. These hypotheses are then tested using panel data for 130 countries over the period 1995-2001. Our findings support the idea that transnational network ties linking countries to the wider global community influence adoption decisions. Thus, exports to the EU and Japan, local involvement of transnational corporations (TNCs), colonial ties to Europe and the availability of telecommunications, all emerge as statistically significant determinants of ISO 9000 counts. Our results also underscore the importance of national environmental conditions. Low regulatory burden, a high share of manufacturing activity, high rates of secondary school enrolment and low levels of productivity are positively associated with a high number of certificates. We conclude that globalization has increased the mobility of organizational innovations across national borders. Yet, country-level variations in (a) transnational network linkages and (b) environmental conditions influencing the receptiveness of organizations to new economic practices, suggest that spatial unevenness is an inevitable feature of organizational diffusion at the global level.

Keywords: ISO 9000, standards, cross-national diffusion, globalization, institutionalism

Introduction

The aim of this paper is to explain cross-national variations in the adoption of ISO 9000, a series of voluntary private standards, developed and promoted by the Geneva-based International Organization for Standardization (ISO). The standards define procedures for quality management and are intended to provide external assurance of quality to customers.

Following their release in 1987 take-up of ISO 9000 advanced most rapidly in the European Union (EU). Many other developed and developing countries have since adopted the standards such that by December 2001, the end of our study period, 161 countries were host to ISO 9000 certified facilities. Yet, despite its geographic spread, the number of certified facilities remains highly uneven across the globe.

For geographers such cross-country variations in the take-up of ISO 9000 are of particular interest. This is because they provide a unique opportunity to investigate the factors shaping the diffusion and adoption of organizational innovations. There is growing recognition that such innovations – ideas, practices, strategies, etc. – can have a profound influence on the geography of economic activity. Thus, productivity, competitiveness, firm structure, buyer-supplier relationships, and the geographical distribution of supply chains, are all shaped by organizational innovations (Kogut and Parkinson 1998; Bryson 2000; Frigant and Lung 2002; Clark 2003).

Yet, despite their obvious importance, relatively little is known about the mechanisms and geographic preconditions underpinning the diffusion of organizational innovations (Firth 1996; Alänge, Jacobsson and Jarnehammar 1998; Sturdy 2001). This gap is particularly acute at the global scale. Thus, while a number of studies have examined the cross-national transfer of

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corporate practices, these have largely been based on case-study evidence drawn from a small number of nation-states (Gooderham, Nordhaug and Ringdal 1999; Kollman and Prakash 2001; Clark, Mansfield and Tickell 2002; Delmas 2002). What is more, few of these studies have sought to identify generic facilitators and/or barriers, focusing instead on nationally idiosyncratic institutions promoting and/or inhibiting acceptance of (predominantly) Anglo-American ideologies, practices and strategies (Vitols 2001; Christopherson 2002). In fact, only a handful of studies have empirically investigated the cross-national transfer of organizational innovations at the global scale, with the result that many questions remain unanswered about the generic mechanisms and preconditions for organizational convergence.

A major reason for this gap in the literature is the lack of reliable data. Unlike many technological innovations – steel furnaces, telephones, etc. – little comparable data exist on the take-up of organizational innovations across multiple countries. An important exception is ISO 9000. The International Organization for Standardization (ISO) has collected data on national certification counts since 1993, providing valuable insight into the cross-national diffusion of organizational practices at the global scale.

Given this coverage it is perhaps surprising that only one previous study has investigated the global diffusion of ISO 9000. Adopting a new-institutionalist framework, Guler, Guillén and Macpherson (2002) use regression analysis to examine the influence of several hypothesized factors on national certification counts. The authors find that the number of ISO 9000 certificates is positively correlated with levels of inward foreign direct investment, government consumption, wealth and size of the labor force. Moreover, suggesting that organizational practices diffuse within networks of social influence, they find that countries which enjoy close

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trade ties and/or are similar in terms of the products they trade are more likely to have a similar number of ISO 9000 certificates.

In this paper we follow a similar approach. Yet we extend their analysis in three important ways. First, whereas Guler, Guillén and Macpherson hypothesize that the uptake of ISO 9000 is primarily governed by institutionalized pressures for organizational conformity, our analytical framework recognizes that adoption decisions may additionally be influenced by efficiency motives. Besides social influence through network ties, therefore, we test for the influence of several geographic factors hypothesized to influence the profitability of ISO 9000 certification. Second, in contrast to Guler, Guillén and Macpherson, we use a lagged dependent variable. This facilitates identification of the geographic determinants of adoption by helping us to control for self-reinforcing contagion dynamics. And third, our dataset includes a far larger number of countries (N=130), providing a more globally-representative test of the determinants of organizational diffusion. Data limitations mean that Guler, Guillén and Macpherson are forced to omit a substantial number of countries from the analysis (N=85), opening-up the possibility of sample selection bias in their estimations.

The rest of the paper is organized as follows. Section 2 outlines the origins, nature and requirements of ISO 9000. Section 3 briefly reviews the existing theoretical literature on the diffusion of technological and organizational innovations. Section 4 develops a series of hypotheses regarding the determinants of national certification counts. Section 5 describes data and methods used in the study and Section 6 presents results. Discussion and conclusions are provided in Section 7.

The nature and implications of ISO 9000

One of the defining features of the global business environment over the past two decades has been the emergence of quality as a key factor in competitive success (van der Wiele, Dale and Williams 2000; Withers and Ebrahimpour 2000). Accompanying this so-called “quality revolution” has been a succession of organizational innovations designed to assist firms in quality management. Originally these innovations – for example, quality circles, total quality management (TQM), just-in-time (JIT), etc. – were based on loosely codified principles articulated by consultants and management texts. More recently, however, standardized systems of quality management have been developed, first at the national level, and subsequently the international one.

The emergence of quality management standards has not taken place in isolation. Rather, they are part of a broader trend towards governance through standardization (Abbott and Snidal 2001; Kollman and Prakash 2001). This trend has been especially pronounced at the global level where growing cross-border economic integration has heightened the need for common standards to facilitate co-operation and co-ordination between firms. In the absence of a world state the task of designing, implementing and enforcing standards has increasingly been taken-up by various regional and/or global institutions. Some of these are governmental organizations. Many others, however, are non-governmental (Brunsson and Jacobsson 2000; Haufler 2001). Their involvement in standard-setting has gone hand-in-hand with a more general shift towards private sector involvement in areas of governance traditionally occupied by the state.

The International Organization for Standardization (ISO) is the largest and perhaps best-known private standard-setting body at the global level. Comprising national standard institutes

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from 130 countries its overarching goal has been to facilitate international trade and investment by harmonizing otherwise diverse and conflicting national standards with international ones (Stevenson and Barnes 2001). The majority of the ISO's standards are technical in nature, defining the specifications that various products should possess. The ISO 9000 series, by contrast, are procedural standards. Rather than standardizing technical specifications, the standards define a comprehensive set of quality management practices. Their chief purpose is to provide external quality assurance to customers by demonstrating a supplier's compliance with a formalized and documented quality management system.

The ISO 9000 series was originally released in 1987 and subsequently revised and updated in 1994 and 2000. The series comprises five individual standards. Two of these, ISO 9000 and ISO 9004, are so-called guidance standards designed to assist applicants of ISO 9000 in quality system improvement. While the other three, ISO 9001, ISO 9002 and ISO 9003, are contractual standards. They define the basic requirements for establishing, maintaining and documenting a certifiable quality management system. As of December 2000, these three standards were replaced by a single one, ISO 9000: 2000.

ISO 9000 is based on a number of principles for achieving quality. These principles – for example, customer satisfaction, continual improvement and preventive action – are highly generalized allowing ISO 9000 to be readily adapted to the needs of a wide range of organizations, regardless of their size, ownership or economic sector (Casper and Hancke 1999; Furusten 2000). Applicants wishing to become certified to a chosen standard must first undergo an audit. Administered by an approved third-party registrar the audit verifies whether the facility's operations comply with the documented procedures described in its quality management system. Subject to a satisfactory inspection a certificate is issued by the registrar

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qualifying the organization to declare itself ISO 9000 accredited. Periodic surveillance audits are required to ensure continued compliance with the standards (Mendel 2002).

The business value of ISO 9000 has been extensively debated in the management literature (Dick 2000; van der Wiele, Dale and Williams 2000; Withers and Ebrahimpour 2000; Stevenson and Barnes 2001; Corbett, Montes and Kirsch 2002). Supporters point to several benefits accruing to ISO 9000 certified organizations. First and foremost, these include external benefits of increased customer satisfaction and market share, followed by internal benefits in terms of improved operational efficiency and productivity. In fact, despite being conceived primarily as a tool for achieving external quality assurance, firm-level surveys reveal that the internal benefits enjoyed by certified companies are often greater than the external ones (Larsen and Häversjö 2000). Critics, however, have questioned the alleged benefits of ISO 9000. They point to the high financial costs of certification. They also question whether ISO 9000 actually contributes to improved product quality and market competitiveness. Suffice to say, while many studies find a positive correlation between certification and business performance (e.g., Withers and Ebrahimpour 2000), several others find that ISO 9000 has little or no impact on long-term profitability (e.g., Wayhan, Kirche and Khumawala 2002). Perhaps unsurprisingly, therefore, doubts persist over the efficiency of the standards.

What is clear, however, is that ISO 9000 has proved a spectacular success. At the end of 2001, the end-year of our study period, more than 510,000 certificates had been issued in 161 countries across the globe. Yet a striking feature of certification activity is its geographically uneven distribution. Europe and the Far East regions are host to the largest number of certificates and account for the bulk of the world's total – see table 1. On a country basis, with more than 66,000 certificates, the United Kingdom has the highest number of ISO 9000 certified facilities,

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followed by China with over 57,000. Several EU countries, Japan, the United States, Australia and South Korea also feature in the top 10 – see table 2. A number of rapidly industrializing countries in Asia and Latin America also have comparatively high national ISO 9000 counts. Elsewhere enthusiasm for the standards has been far lower. Iran, for example, has only 618 certified facilities to its name and Bangladesh a mere 38. Relative to population size, Australia has the highest number of ISO 9000 certificates, followed by the UK and various EU countries. A handful of smaller countries, including Ireland, Israel and Singapore, also have high per capita certification counts.

< Insert Tables 1 and 2 about here >

The goal of this paper is to explain these variations in national certification counts, and in doing so, advance current understanding of the mechanisms and geographic preconditions underpinning the uneven diffusion of organizational innovations at the global level. To achieve this, we depart from previous cross-national diffusion studies, based largely on qualitative evidence drawn from a handful of nation-states. Instead, our paper takes a quantitative approach, and uses econometric techniques to estimate the influence of several hypothesized variables on certification counts for a sample of 130 countries.

Before proceeding to develop our theoretically-derived hypotheses two important caveats are in order. First, ISO 9000 is a very specific type of organizational practice, meaning that our findings may not be fully generalisable to other ideas, practices and strategies that help to shape the geography of economic activity. In particular, because its content and implementation are standardized in a set of written rules, we might expect ISO 9000 to be more geographically

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mobile than less codified organizational innovations. The central importance of customer requirements as a motive for adoption (Anderson, Daly and Johnson 1999; Terziovski, Power and Sohal 2003) additionally suggests that market actors are likely to play an unusually important role in inter- and intra-country diffusion patterns.

A second caveat relates to data. The availability of measurable proxies and variables for our sample of 130 countries is limited. Consequently, in common with other researchers who take a large-sample approach (Singh 1995; Dekimpe, Parker and Sarvary 2000), we are forced to omit a number of national characteristics that might possibly influence certification counts. These include several institutional factors – for example, corporate cultures, private-public relations, etc. – identified in previous research as important determinants of organizational diffusion.

Nevertheless we believe that our study makes a valuable contribution to the literature. Our goal is to identify generic determinants for the adoption of organizational practices. Therefore, the present approach, which privileges generalizability over specificity, suits the research purposes well.

Insights on the diffusion of organizational innovations

A number of distinct, and sometimes incommensurable, theoretical perspectives dominate the diffusion literature. Broadly speaking, however, they can be divided into two streams. The first, commonly referred to as the efficient-choice approach, argues that adoption decisions are based on the performance and/or profitability of innovations (Davies 1979; Rosenkopf and

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Abrahamson 1999; Stonemann 2002). Variants of this approach assume different levels of information. Yet they all model decision-makers as rational, calculative agents who select among alternatives according to their efficiency.

The second set of approaches, widely associated with the new-institutionalism in economic sociology, reject the idea of profitability and/or performance as the primary motive behind the adoption of innovations (Clark 2003). Although accepting that early adoption decisions may be influenced by efficiency considerations, they argue that later adopters are characteristically driven by a range of social pressures to adopt similar organizational practices. These may have little to do with enhancing economic and/or technical performance, but rather, maintenance of external legitimacy.

In a seminal piece, DiMaggio and Powell (1983) describe three such social pressures – coercive, mimetic and normative – which shape the demand for innovations and result in organizational isomorphism. Coercive pressures operate where firms are ‘...compelled or mandated through regulation or exchange’ (Mendel, 2002: 48) to conform to certain practices. Mimetic isomorphism arises where organizations imitate the attitudes and behavior of others, and especially organizations that are seen as legitimate and/or successful (Haveman 1993; Benjamin and Podolny 1999; Rosenkopf and Abrahamson 1999). While normative pressures refer to the influence of professionals who define norms of rationality and progress, and prescribe “best practice” solutions to specific problems (Galaskiewicz and Wasserman 1989; Abrahamson 1996).

Institutionalist, inefficient-choice approaches dominate the recent literature on the diffusion of organizational practices. In fact, in the only previous study to investigate the global spread of ISO 9000, Guler, Guillén and Macpherson (2002) develop a new-institutionalist

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framework to model cross-national transfers. Underpinning the choice of neo-institutionalist approaches is the observation that the economic returns from organizational innovation are often ambiguous. Hence, the emphasis on norms, rhetorics and ideologies of “best practice”, which are assumed to shape adoption decisions under conditions of complexity and uncertainty (DiMaggio and Powell 1983).

We agree that institutional pressures are likely to play a leading role in the diffusion of ISO 9000. Besides, their influence has been convincingly documented in a number of recent qualitative and quantitative contributions examining the diffusion of organizational innovations, both within and across nation-states (Zbaracki 1998; Guler, Guillén and Macpherson 2002; Nelson and Gopalan 2003). Yet, we argue that institutionalist approaches are “underrationalized” (Strang and Macy 2001, p156), and that economic considerations are likely to shape the decision to adopt quality management standards. Indeed, recent research appears to support this interpretation, suggesting that both institutional and efficiency motives commonly explain diffusion processes involving organizational innovations (Kogut and Parkinson 1998).

Our analytic framework, therefore, not only recognizes a central role for institutionalized norms, expectations and rules in explaining diffusion patterns. It is also open to the possibility that efficiency might influence adoption decisions. Put simply, while managers can be induced, coerced or regulated to adopt ISO 9000, the extent to which they are receptive to these pressures will partly be a function of profitability. Of course, and as long-recognized by organizational scholars, this does not mean that managers are rational, optimizing agents (Furusten 2000; Williamson 2000). They are not. Yet it would be surprising if geographic factors influencing efficiency – or indeed the supply of information about profitability and/or performance – did not affect adoption rates.

Combining these perspectives – new-institutionalist and economic – the next section develops a series of hypotheses about the conditions promoting and/or inhibiting ISO certification where the unit of analysis is the nation-state. Our hypotheses are divided into two broad categories. The first are concerned with transnational network ties which provide a conduit for the transfer of ISO 9000 between countries. While the second set of hypotheses are primarily concerned with country-level environmental conditions that influence the receptiveness of organizations to the standards.

Development of hypotheses

(a) Transnational network ties

The concept of transnational networks has become popular in geography over recent years (Amin and Thrift 1992; Castells 1996; Fuchs 2002). Underlying this interest is growing recognition that firms are embedded in complex relational networks that provide conduits for the diffusion of information, norms and practices across national boundaries (Pastor, Meindl and Hunt 1998).

One of the most pervasive forms of transnational network is created by international trade. We argue that a country's trading ties are likely to have a significant impact on national ISO 9000 counts for two reasons. First, networks of trade connect customers in one country with suppliers in another, and consequently provide a channel for the transmission of coercive pressures. Many certified firms, and especially large and/or multinational ones, routinely specify ISO 9000 as a contractual condition of supply (Casper and Hancke 1999). Hence, for countries

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exporting a large share of their output to markets with high levels of certification activity, significant incentives will exist to adopt ISO 9000. Supporting this interpretation are countless surveys suggesting that “market access” and “customer requirements” are lead motives for certification activity (Vloeberghs 1996; Buttle 1997; Ebrahimpour, Withers and Hikmet 1997; Chittenden, Poutziouris and Mukhta 1998; Capmany, Hooker, Ozuna and van Tilburg 2000).

Trade also increases the frequency of formal and informal interactions between actors located in geographically dispersed markets. These interactions create networks of “weak ties” (Granovetter 1973) which support the voluntary exchange of information about the technical performance and/or profitability of specific organizational innovations. They additionally provide conduits for the transfer of professional norms and expectations, and therefore, institutionalized pressures for isomorphism (Galaskiewicz and Wasserman 1989; Schrader 1991; Hislop, Newell, Scarborough and Swan 1997; Alänge, Jacobsson and Jarnehammar 1998).

Taken jointly, these arguments imply that countries which export a higher share of their output to EU countries and/or Japan are likely to have a larger number of ISO 9000. Both the EU and Japan have long-established traditions of quality management and, moreover, have been at the forefront of ISO 9000 certification (Strang and Soule 1998; Anderson, Daly and Johnson 1999; McCalman, Wilkinson and Brouthers 2000). Consequently, we might expect trading partners of these countries to share their commitment to the standards, not least because of the threat of market sanction. This is consistent with Corbett’s (2003) study of ISO certification in 9 countries which suggests that supply-chain pressures by early-adopters resulted in the spread of the standards to late-adopters. Hence:

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Hypothesis 1. Countries which export a larger share of their goods and services to EU countries and Japan are likely to have a higher number of ISO 9000 certificates.

Transnational production networks, centered on and around transnational corporations (TNCs) and their subsidiaries, comprise another business network supporting the diffusion of organizational innovations at the global level (Firth 1996; Dicken 1998; Ferner and Quintanilla 2002). We hypothesize that their influence on the geography of ISO 9000 is two-fold. First, TNCs contribute to the uptake of ISO 9000 directly, by certifying their regional and/or global networks of subsidiaries (Yahya and Goh 2001). Anecdotal reports suggest that TNCs have been at the forefront of certification activity. Moreover, many are deploying ISO 9000 on a corporate-wide basis, since the standards offer a flexible and widely-accepted system for quality management and assurance.

A second way in which TNCs impact national 9000 counts is by influencing certification activity among domestically-owned firms. Transnationals can compel upstream suppliers to adopt the standards through local procurement rules specifying ISO 9000 as a qualifying criterion. The exercise of such coercive pressures by TNCs is well-documented in the literature (UNCTAD 1999) and can be interpreted as an important governance mechanism in supply chains.

Less obviously, TNCs might stimulate certification among domestic firms by acting as normative models of “best practice”. According to new-institutionalists, organizations often imitate the practices and strategies of other organizations they perceive as legitimate and/or successful (DiMaggio & Powell, 1983). Mimicry allows firms to associate themselves with their more prestigious counterparts, granting managers a degree of legitimacy for their strategic

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choices. While there is some debate in the literature as to the attributes of success, most accounts point to profitability and/or size (Haveman 1993; Benjamin and Podolny 1999). Since TNCs characteristically exhibit one or both of these attributes, we would expect other firms to imitate their behavior, including their enthusiasm for ISO 9000.

Through these processes, therefore, the local involvement of transnationals is likely to be conducive to the diffusion of ISO 9000. Previous cross-country evidence corroborates this thesis, suggesting a positive and statistically significant relationship between certification of both ISO 9000 and ISO 14001¹ and inward investment by TNCs (Guler, Guillén and Macpherson 2002; Neumayer and Perkins 2004). Hence:

Hypothesis 2. Countries with more investments by TNCs are likely to have a higher number of ISO 9000 certificates.

Of course, it is not only contemporary linkages that potentially influence adoption patterns, but also historical ones. Arias and Guillén (1998: 115) note that historical interdependencies have largely been overlooked in the existing literature on cross-national diffusion. Yet, given the durable nature of economic, social and political institutions (Hall and Soskice 2001), there are sound reasons to suppose that they will continue to influence the transfer of organizational innovations across national borders.

Particularly significant in this respect is colonialism, experienced by all but a handful of today's developing economies (Smith 2003). Although the majority of colonies have since gained independence there is plenty of evidence to suggest that they continue to enjoy close

¹ ISO 14001 is the equivalent process-based standard for environmental management systems

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economic, political and social ties with former colonial powers. Neumayer (2003), for instance, demonstrates that patterns of bi-lateral aid remain heavily influenced by former colonial linkages. These and other ties are likely to prove important channels for organizational diffusion across national boundaries. Thus, Arias & Guillén (1998) describe how the exchange of students, managers and professionals as part of bi-lateral aid schemes during the post war-period, led to the transfer of economic practices from Europe and the US to developing countries.

What this suggests, then, is a pattern of diffusion from developed economies with high numbers of ISO 9000 certificates to their ex-colonies. In practice, this means former colonies of EU member states, and particularly ones which were under colonial control for a prolonged period of time:

Hypothesis 3. Countries which spent a longer period under EU colonial rule are likely to have a higher number of ISO 9000 certificates.

At a more general level we expect the take-up of ISO 9000 to be influenced by the size and diversity of a country's network contacts. Empirical work has shown that early adopters are characteristically more cosmopolitan than late adopters (Rogers, 1995). By interacting with a wider range of actors outside their immediate social system cosmopolitan actors are more likely to be exposed to informational and/or social influences promoting adoption (O'Neill, Poudier and Buchholtz 1998). Extending these insights to cross-national diffusion processes suggests that the transfer and adoption of ISO 9000 will be shaped by the availability of cross-country communications media. Access to telephones, faxes, the internet, etc., increases the likelihood of interactions between adopters and potential adopters in different nation-states, and therefore,

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cross-country contagion (Guillén 2001). Indeed, given that there are no internationally-recognized substitutes to ISO 9000, we expect generic communications channels to assume particular importance in the worldwide spread of the standards:

Hypothesis 4. Countries with a greater availability of telecommunications media are likely to have a higher number of ISO 9000 certificates.

(b) Characteristics of the national environment

The diffusion of organizational innovations not only takes place between nation-states but also within them (True and Mintrom 2001). As well as transnational networks ties, therefore, we expect the geographic pattern of certification to be influenced by national environmental conditions. These conditions shape the supply of information, norms and regulatory pressures. They also define the financial returns (i.e., efficiency) from adoption. Hence characteristics of the national environment are likely to have a major influence on the receptiveness of organizations to new innovations.

One of the most significant actors influencing the environment into which organizational innovations are imported and diffused is the state (Arias and Guillén 1998). Driven by the belief that ISO 9000 certification can enhance industrial competitiveness, governments – in developed and a growing number of developing countries – have actively encouraged take-up of the standards. In this capacity, they have offered firms technical and/or financial assistance, primarily to lower the economic costs of implementation and registration (Mizuno 2002). They have also advanced ISO 9000 as a model of best practice using promotional material – brochures, seminars, etc. – highlighting “success stories” of efficient adoptions (Mendel, 2002).

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Much like private actors state ones have also created coercive pressures for certification. This process began in 1989 when the EU took the pioneering decision to incorporate ISO 9000 into its “Global Approach to Testing and Certification”, and subsequent “New Approach Directives.” By permitting manufacturers to meet conformity requirements using ISO 9000, the Commission provided a powerful incentive for certification among European firms, together with their suppliers (Mallak, Bringelson and Lyth 1997; Anderson, Daly and Johnson 1999; McCalman, Wilkinson and Brouthers 2000). Many governments have since gone on to list the standards in their conformity assessment procedures. A growing number have also incorporated ISO 9000 into public-sector procurement guidelines (Beattie and Sohal 1999). For these reasons, we anticipate that countries whose governments are more involved in the economy in terms of government consumption, governmental production of goods and services, and government ownership of production facilities, will have a higher certification count. Hence:

Hypothesis 5. Countries with high levels of government involvement in the economy are likely to have more ISO 9000 certificates.

Yet the state’s role in the diffusion of ISO 9000 certification is ambiguous. General government involvement may well promote certification, but where this involvement reduces the efficiency of adoption, the opposite might be true. Thus, where government intervention negatively impacts financial returns – for instance, because firms are subject to an elaborate, complicated and burdensome regulatory process – organizations are unlikely to make significant, long-term investments. The same is to be expected where governments increase investment uncertainty through the uneven application of regulations and/or corruption. Conversely, where

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the regulatory burden on firms is comparatively low and/or regulations are applied in a uniform way, firms are more likely to make large investments in new organizational practices. This includes ISO 9000 which involves a substantial up-investment, and moreover, one whose returns are likely to be realized over the longer-term (Bierão and Sarsfield Cabral 2002). Hence:

Hypothesis 6. Countries with a lower regulatory burden imposed on the private economy are likely to be hosts to a larger number of ISO 9000 certificates.

More generally, by influencing the real and/or anticipated financial returns from efficiency-enhancing organizational practices, we expect productivity levels to impact certification activity. Although market requirements routinely emerge as the lead motive for ISO 9000 surveys reveal that “productivity” and “efficiency” are significant reasons for seeking certification (Buttle 1997). Productivity motives are likely to be especially important among organizations characterized by low levels of productivity. Such organizations are unlikely to have exploited many low-cost, high-return investments in operational efficiency. Consequently, we predict that they will earn a higher financial return from ISO 9000, which is well-suited to identifying and realizing productivity-enhancing investment opportunities:

Hypothesis 7. Countries with lower levels of productivity are likely to have a higher number of ISO 9000 certificates.

Levels of education, too, might influence the propensity to adopt organizational innovations. Organizations in countries with better-educated workforces are likely to find it

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cheaper to implement new organizational models and hence earn higher financial returns from adoption. As noted above, the procedural requirements of ISO 9000 are extensive, particularly in terms of planning, monitoring and documentation. Hence, we anticipate the profitability of ISO 9000 to be sensitive to educational levels, with poorly educated workforces finding it especially difficult and costly to achieve certification:

Hypothesis 8. Countries with higher education levels are likely to have a higher number of ISO 9000 certificates.

Structural characteristics of the national economy are also likely to shape patterns of organizational diffusion. We predict that countries with a larger manufacturing base will have a higher number of ISO 9000 certificates. Manufacturing firms characteristically face powerful incentives for certification. The importance of quality to the safety, reliability, etc., of their output means that manufacturers are often subject to coercive pressures from upstream buyers. Markets for many manufacturing goods, and especially standardized and/or internationally-traded ones, are also highly price competitive. As a result, manufacturing firms face especially strong pressures to cut costs, providing an additional motive for adopting efficiency-enhancing organizational practices. This is likely to support the adoption of ISO 9000 which, in addition to improving product quality, is well-suited to identifying and realizing cost-savings through operational improvements (Larsen and Häversjö 2000). Together, this suggests that ISO counts will be higher in manufacturing-based economies, a predication supported by reports suggesting that certification activity has proceeded most rapidly in the industrial sector (Chittenden, Poutziouris and Mukhta 1998; Acharya and Ray 2000; Brown 2004):

Hypothesis 9. Countries with a greater share of manufacturing in GDP are likely to have more ISO 9000 certificates.

Research Design

Our dependent variable is the number of ISO 9000 certified facilities at the national level (ISO, 2001, 2002) normalized by population size in order to make counts comparable across different-sized countries (*ISO9000PC*). National ISO certification counts are available from 1993 onwards. We lose the first year due to the inclusion of the lagged dependent variable in the regressions. Moreover, since 1993 and 1994 data refer to mid- rather than end-of-year, we restrict our sample to the period 1995-2001, all of which refer to end-year counts.² Data for ISO 9000 are available for 2002, but many of our explanatory variables are not, with the result that we are forced to omit this year from the analysis.

To test the influence of transnational network ties on national certification counts we use four explanatory variables. The first is the combined value of exports of goods and services to the 15 EU member states and Japan relative to the exporting country's gross domestic product (*EXPGDP*). For EU countries, this variable refers to exports to the other 14 EU states plus Japan; while for Japan it measures exports to the EU 15. These data are taken from OECD (2003). The second variable is the stock of FDI relative to GDP (*FDISTOCKGDP*) as reported by UNCTAD

² For the year 1995, we include the lagged value of the dependent variable from 1994, however, in order to avoid a further reduction in sample size.

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(2003). FDI stock is a better measure of the overall level of TNCs involvement in host economies than short-term FDI inflows and therefore is well-suited to testing our research hypothesis. Our third explanatory variable measures the number of years a developing country has been under European colonial rule between 1900 and 1960 (*COLONY*) as documented by Alesina and Dollar (2000). And fourth, we use the number of main telephone lines per 100 inhabitants (*TELEPHONESPC*) as a proxy for the availability of telecommunications, with data taken from ITU (2003).

Characteristics of the national environment are captured by a set of five variables. First, we use a sub-component of the Heritage Foundation's (2003) Index of Economic Freedom, which ranks countries on a one-to-five scale according to general government involvement in the economy (*GOVINVOLVEMENT*). Countries are graded with respect to: (a) the level of government consumption as a percentage of the economy; (b) the extent of government ownership of businesses and industries; (c) the share of government revenues from state-owned enterprises; (d) government ownership of property; and (e) economic output produced by the government. Higher values imply greater government involvement. Whilst this variable measures general government involvement, another sub-component of the Index of Economic Freedom provides a measure of the regulatory burden imposed on private businesses (*REGBURDEN*), again ranked on a one-to-five scale. A country is rated one if existing regulations are straightforward and applied uniformly to all businesses and corruption is nearly nonexistent. While, at the other end of the scale, a rating of five is reserved for countries where the government impedes the creation of new businesses, corruption is rampant and regulations are applied randomly.

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The third variable in this group uses gross secondary school enrolment ratio as a proxy for the national level of education (*%SECONDEDUCATION*). These data are taken from World Bank (2003) and UNESCO (2003). Ideally, we would have liked to use a variable that measured the educational status of the workforce directly. However, the only measure fitting this description has very poor cross-country availability, meaning that we resort to secondary school enrolment. The manufacturing share of GDP (*%MANUFACT*), the fourth variable, is taken from World Bank (2003) and is complemented by data provided by CIA (2002). For our measure of economic productivity (*GDPPERWORKER*) we use GDP in purchasing power parity (PPP) divided by the size of the labor force (*GDPPERWORKER*). All data are from World Bank (2003).

Finally, as an additional control variable, we include total GDP in PPP (*GDP*). In the absence of data on the number of facilities in a country, we realistically assume that the number of potential adopters is a functional of total economic size. Countries with more facilities are also more likely to host innovative, early-adopters who experiment with ISO 9000 and subsequently influence others to adopt the standards (Rogers 1995). Table 3 provides summary descriptive variable information.

< Insert Table 3 about here >

We estimate the following model:

$$\ln y_{it} = \alpha + \beta_1 \ln y_{it-1} + \beta_2 x_{it} + \gamma_t T_t + v_{it}.$$

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The subscript i represents each country in year t , y is the number of ISO 9000 certifications and x is the vector of explanatory variables. The dependent variable is logged in order to reduce heteroscedasticity and render its distribution less skewed. To do so, we are forced to add one to the absolute number of ISO 9000 counts, since the log of zero is undefined. As concerns the explanatory variables, we take the log for those with highly skewed distributions, leaving the others in their level form. The year-specific dummy variables T capture general developments such as rising worldwide levels of awareness about the standards and correct for unobserved time effects. The v_{it} is a stochastic error term. We estimate equation (1) with Beck and Katz's (1995) popular and commonly applied time-series cross-sectional estimator with panel-corrected standard errors. The error term is presumed to be heteroskedastic and contemporaneously correlated across countries. Beck and Katz (1995) provide Monte Carlo evidence that this estimator typically produces more conservative estimates of standard errors than the alternative estimator, feasible generalized least squares (FGLS).

The use of a lagged dependent variable has several advantages. First, and most importantly, it allows us to control for the dynamics of ISO 9000 diffusion, taking account of the fact that the number of previous adoptions typically influences the number of subsequent ones (Rosenkopf and Abrahamson 1999). Second, by using a lagged dependent variable, we are able to substantially reduce any autocorrelation. And third, the lagged dependent variable is correlated with potentially omitted variables. No econometric model is ever complete and several potential determinants of ISO 9000 certification are difficult to capture. Inclusion of the lagged dependent variable thus tends to mitigate potential omitted variable bias (Finkel 1995).

We have data available for a large panel of 130 countries. In a further estimation, we exclude developed countries from the sample to see whether our hypotheses hold in the case of

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developing countries, many of which have comparatively low certification counts. Developed countries include Canada and the United States, the 15 EU countries, Iceland, Norway, Switzerland, Japan, Australia and New Zealand. Table 4 lists the countries included in the full sample.

< Insert Table 4 about here >

Results

Table 5 presents our estimation results where column I refers to the full sample and column II to the developing country only sample. Consistent with *a priori* expectations we find that transnational network ties impact take-up of ISO 9000. A larger stock of FDI, higher share of exports to the EU and Japan relative to GDP, and more telephone lines, increase certification counts. The same is true for the length of time under European colonial rule which is positively correlated with ISO 9000. The econometric estimations also support our hypotheses about the importance of national environmental characteristics. Countries with better educated populations, a larger manufacturing base, and lower levels of economic productivity, have higher certification counts.

On the basis of our estimation results we reject the hypothesis that general government involvement in the economy promotes certification activity. Yet the hypothesis that a higher level of government burden imposed on the private economy is detrimental to the adoption of the quality management standards is supported by our estimations. As expected, the lagged dependent variable is highly statistically significant, the inclusion of which also accounts for the

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high R-squared value. The estimated coefficient is clearly below one, however, suggesting that the spread of ISO 9000 is not merely driven by bandwagon effects and the existing level of certification. We also find that bigger economies have a higher of ISO 9000 count than smaller ones.

< Insert Table 5 about here >

If we exclude developed countries from the sample, then the results reported in column II of table 5 are very similar to the full sample results in terms of coefficient sign and statistical significance. The FDI stock variable becomes insignificant, but only very marginally so (p-value of 0.11). This indicates that the results are not simply a function of the presence of developed countries in the sample and that the determinants of certification activity are surprisingly consistent across the globe.

Discussion and conclusions

According to Bryson (2000: 157-158), ‘Central to the geography of economic activity should be an understanding of the transfer of management ideas and techniques into and between companies.’ The purpose of the present paper is to advance current understanding of the mechanisms and geographic preconditions underpinning such transfers at the global level. To this end, using panel data for 130 countries, we investigate the influence of several hypothesized

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variables on adoption of ISO 9000, the internationally-recognized series of standards for quality management.

A particular advantage of our quantitative approach is that it allows us to identify generic facilitators and/or barriers involved in the diffusion process. Previous geographical work has done a poor job in this respect (Sturdy 2001). Drawing on case-study evidence from a small number of economies, researchers have principally been concerned with identifying country-specific institutional characteristics that account for the acceptance or, more often, rejection of innovations (e.g., Christopherson 2002; Delmas 2002). The present paper has sought to move beyond this narrow focus on national specificity by performing a much-needed systematic analysis into the determinants of diffusion success across a large number of developed and developing countries. At the same time, we would like to stress that our quantitative cross-country approach is clearly not superior to more in-depth country studies, but complementary.

Our findings point to two broad determinants that shape the uneven transfer and adoption of organizational practices at the global level. The first are transnational network ties. Our estimations suggest that networks linking different countries function as conduits for the diffusion of organizational practices among geographically dispersed actors. Thus, exports to the EU and Japan, stock of foreign direct investment (FDI), European colonial linkages, and the availability of telecommunications, all emerge as statistically significant determinants of national ISO 9000 counts. Put differently, the level of certification activity is influenced by a country's ties to the wider global community, with national counts directly related to the popularity of the standards in closely linked countries. These findings are broadly in line with those of Guler, Guillén and Macpherson (2002), which emphasize the role of social networks in the worldwide spread of ISO 9000, but derive from a more globally-representative sample.

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The statistical estimations reported in this paper say little about the mechanisms underlying these relationships. Yet they support our theoretically-derived propositions about the role of transnational networks as conduits for the cross-national dissemination of information, norms and regulatory pressures. Given the weight of survey evidence pointing to market requirements as the primary motivation for certification we suspect that coercive pressures principally account for the influence of transnational corporations and trade ties. The influence of colonial linkages and telecommunications, on the other hand, most likely operate by diffusing information about efficiency and/or norms of “best practice”. More research is needed, however, to clarify the nature and importance of these mechanisms.

Consistent with our predications, and moving beyond the determinants hypothesized by Guler, Guillén and Macpherson (2002), we additionally find that characteristics of the national environment influence patterns of organizational diffusion. In particular, we estimate a positive and statistically significant relationship between national ISO 9000 counts and enrolment rates in secondary education and the share of manufacturing in GDP and a negative significant relationship with regulatory burden and economic productivity. Once again drawing causal inferences from these statistical relationships is problematic. Yet the significance of productivity, regulatory burden and education casts doubts over the assumption that diffusion patterns are influenced by institutionalized norms, rules and expectations alone. Firms, in other words, would appear to be sensitive to geographical factors influencing the profitability of adoptions.

This is a significant result. It indicates that ISO 9000 is more than a management “fad” whose take-up is simply driven by the number and/or status of existing adopters (Rosenkopf and Abrahamson 1999). Moreover, reinforcing recent critiques of the “new” economic geography

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(Martin and Sunley 2001), it suggests a role for “economic” factors – besides social, cultural and institutional ones – in explaining the uneven geographies of organizational practice.

In summary, then, the present paper’s findings provide support to the popular idea that globalization – the intensification of economic, political and social linkages at the international level – has increased the mobility of organizational innovations. Rising levels of international trade, investment and the spread of telecommunications mean that ideas, practices and strategies are more likely to travel across national boundaries than in the past. Yet, as evidenced by significant variations in take-up of ISO 9000 at the country level, this does not imply cross-national organizational convergence.

One reason for these continuing differences, of course, is that the process of globalization is itself highly geographically uneven. Flows of inward investment, the availability of telecommunications, and so on, vary significantly across the globe. As such, it is hardly surprising that the transfer and adoption of organizational practices should also proceed in a spatially uneven fashion. Another reason, and one which resonates with the findings of small-sample, qualitative research, is that certain national environments are more conducive to the uptake of organizational innovation than others. In fact, given far-reaching geographic variations in these two broad determinants (i.e., transnational linkages and environmental conditions), it is perhaps inevitable that spatial unevenness is a persistent feature of organizational diffusion at the global level.

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Table 1

Regional share of ISO 9000 certifications (in 2001)

Region	No. of certifications	Share of world total (% of absolute numbers)
Africa/West Asia	19,751	3.87
Central and South America	14,423	2.83
North America	50,894	9.97
Europe	269,950	52.87
Far East	126,779	24.83
Australia and New Zealand	28,819	5.65
World	510,616	100.00

Source: ISO (2002)

Table 2

Top ten countries by ISO 9000 certification count (in 2001)

Country	No. of certifications (absolute numbers)	No. of certifications (per one million inhabitants)	Share of world total (% of absolute numbers)
UK	66,760	1,135.4	13.07
China	57,783	45.5	11.32
Italy	48,109	830.9	9.42
Germany	41,629	505.8	8.15
United States	37,026	129.9	7.25
Japan	27,385	215.6	5.36
Australia	26,750	1,378.9	5.24
France	20,919	353.3	4.10
Spain	17,749	431.8	3.48
South Korea	17,676	373.7	3.46
Total	361,786		70.85

Source: ISO (2002) and World Bank (2003)

Table 3

Descriptive variable information (N = 899)

Variable	Mean	Std. Dev.	Min	Max
ln ISO9000PC	-4.61	2.23	-6.91	0.32
ln ISO9000PC (lagged)	-5.04	2.41	-11.70	0.26
EXPGDP	0.01	0.06	0.00	0.60
ln FDISTOCKGDP	2.67	1.09	-3.11	5.60
TELEPHONESPC	19.92	21.32	0.00	78.00
COLONY	23.35	27.45	0.00	60.00
GOVINTERVENTION	2.63	0.85	1.00	5.00
REGBURDEN	3.25	0.89	1.00	5.00
%MANUFACT	17.92	8.99	3.48	60.00
%SECONDEDUCATION	66.70	34.37	5.30	152.70
ln GDPPERWORKER	22.98	1.31	17.66	27.00
ln GDP	24.40	1.92	19.64	29.82

Table 4

List of countries included in sample

Albania, Algeria, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Canada, Cape Verde, Chad, Chile, China, Colombia, Congo (Rep.), Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, France, Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea-Bissau, Guyana, Hong Kong (China), Hungary, Iceland, India, Indonesia, Iran, Ireland, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Kyrgyz Republic, Laos, Latvia, Lebanon, Lesotho, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Mali, Malta, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Rwanda, Saudi Arabia, Sierra Leone, Singapore, Slovak Republic, Slovenia, South Africa, South Korea, Spain, Sri Lanka, Swaziland, Sweden, Switzerland, Syria, Tajikistan, Tanzania, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, Vietnam, Zambia, Zimbabwe.

Table 5

Estimation results

	I (full sample)	II (developing countries only)
ln ISO9000PC (lagged)	0.729 (10.06)***	0.694 (8.11)***
EXPGDP	1.223 (4.24)***	1.593 (4.05)***
FDISTOCKGDP	0.039 (1.93)*	0.040 (1.60)
TELEPHONESPC	0.014 (4.17)***	0.025 (5.33)***
COLONY	0.001 (1.67)*	0.001 (3.20)***
GOVINTERVENTION	-0.012 (0.87)	0.010 (0.78)
REGBURDEN	-0.086 (3.05)***	-0.094 (2.50)**
%MANUFACT	0.010 (9.03)***	0.007 (5.84)***
%SECONDEDUCATION	0.003 (3.70)***	0.002 (3.43)***
ln GDPPERWORKER	-0.019 (2.76)***	-0.029 (2.67)***
ln GDP	0.072 (3.58)***	0.118 (4.87)***
Observations	899	738
Countries	130	107
Adjusted R-squared	0.95	0.92

Note: Dependent variable is the logged number of ISO 9000 certifications per million

inhabitants. Absolute z-statistics in parentheses. OLS estimation with panel-corrected standard errors. Constant and year-specific time dummies included, but coefficients not reported. * significant at .1 level ** at .05 level *** at .01 level