THE JOURNAL OF BUSINESS INQUIRY

Volume 14 Issue 1 2015

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Utah Valley University Woodbury School of Business

ISSN 2155-4072 (online)

The Journal of Business Inquiry 2015, 14, Issue 1, 1-22
http:www.uvu.edu/woodbury/jbi/articles
ISSN 2155-4072

Drivers of eParticipation: Case of Saudi Arabia

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This study provides insights regarding the intentions of users participating in eGovernment activities in Saudi Arabia. A user-centric model of eParticipation is advanced, based on a review of the literature and empirical tests. We conducted an online survey of 200 citizens and residents of Saudi Arabia. The results of this study indicate that four variables positively influence eParticipation intentions: trust of the government, attitude towards eParticipation, use of social media, and social influence and identity. Interestingly, perceived benefits of eGovernment were statistically significant, but they were negatively related to eParticipation intention. Only two demographic variables, age and gender, are significantly related to the level of eParticipation; age is positively related, and gender is negatively related. This suggests that as people become more mature, they are more willing to participate in the country's governance via online channels; it also appears that women are less likely than men to participate through online media. It seems that eParticipation rates could increase if people could be assured of anonymity, if information would not be used against participants, and if the impact or result of their eParticipation on policy and decision-making processes could be observed and verified. Participants do exhibit favorable attitudes towards government's attempts to encourage eParticipation in Saudi Arabia. Finally, while participants recognize the benefits of interacting with the government through social media—and recognize the likelihood of social media playing a more prominent role in future—currently, they are uncomfortable with the concept and practice of eParticipation.

Keywords: eGovernment, eParticipation, Social Identity, Social Influence, Social Media, Saudi Arabia

JEL Classification: I28, I18, G38, D78, P21

I. Introduction

Generally, eGovernment refers to the use of information and communication technologies to deliver government information and services online and to interact and transact with citizens, businesses, and governments (Burn and Robins, 2003). eGovernment involves digital channels, including websites, mobile-based services, and public access points such as kiosks, databases, networking, discussion support, multimedia, automation, tracking and tracing, and personal identification technologies (Jaeger, 2003). eParticipation refers to the use of digital technologies

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to encourage and support "top-down" engagement, or to foster "ground-up" efforts to empower citizens to gain their support (Macintosh and Whyte, 2008).

According to Jaeger and Thompson (2003), eGovernment can provide significant benefits for citizens, businesses, and governments around the world. eGovernment is viewed as a key to shrinking communications and information costs, maximizing speed, broadening reach, and eradicating distance (Norris, 2001). Similarly, eParticipation, which may be government- or citizen-initiated (Thomas and Streib, 2003; Zuckerman and West, 1985), is considered to be an enabling mechanism for creating democratic values (Moynihan, 2003; Nabatchi, 2012). However, citizen acceptance and participation are crucial for realizing the potential benefits of eGovernment (Persaud and Persaud, 2013).

Over the last decade, considerable academic research on eGovernment and eParticipation has focused on developed nations, while research on less-developed countries has been less extensive (Al-Ghaith *et al.*, 2010; Alshehri *et al.*, 2012) and has tended to study more of the technologies of eGovernment rather than understanding users' needs (Alharbi and Kang, 2014; Persaud and Persaud, 2013). In particular, the research on Saudi Arabia has tended to focus primarily on eGovernment design, delivery, services, technologies, and adoption (e.g., Al-Ghaith *et al*. 2010; Alshehri *et al*. 2012; Dwivedi and Weerakkody, 2007), with little or no emphasis on eParticipation. The focus of eParticipation is on citizens' engagement in the political-, policy- and decision-making processes of their country as well as citizen-to-citizen and citizen-to-government interactions via online channels (Macintosh and Whyte, 2008). This study contributes to eGovernment research in the Kingdom of Saudi Arabia by focusing on eParticipation.

Our study examines various factors that influence Saudi users' eParticipation in government policy and decision making. A deeper understanding of these factors could inform policy and programs aimed at increasing eParticipation in Saudi Arabia as well as contribute to the growing empirical and theoretical literature on eParticipation. The Saudi government has, over the last decade, invested heavily in numerous sophisticated web-based technologies and tools aimed at promoting eParticipation (Al-Ghaith *et al*. 2010; Alshehri *et al*. 2012). However, citizen eParticipation engagement remains elusive. Why do eParticipation rates remain low? Is it because of weaknesses in eGovernment design and delivery? Or it is perhaps due to problems associated with eGovernment strategy and implementation? It may well be that citizens implicitly refuse to eParticipate due to a variety of concerns such as privacy and the misuse of information. It also seems plausible that there may be a mismatch between the expectations of government and the citizens of this Kingdom nation.

In order to provide a context for this study, a brief description of Saudi Arabia will be useful. Saudi Arabia has the largest economy in the Arab world and holds the world's second-largest proven oil reserves. It has a population of approximately 30 million people, of which just under one-third or 10 million are foreign residents (Central Department of Statistics and Information, 2010). Many jobs in Saudi Arabia are filled by foreign workers, while significant unemployment persists among Saudi citizens (Gause *et al*., 2012; Lippman, 2012; Ramady, 2010).

Saudi Arabia's culture is rooted in conservative Islam (Havenaar, 1990). The family is one of the important institutions in Saudi society and is typically "extended" to include parents, siblings, grandparents, aunts, uncles, and cousins. In such a family-centered milieu, grandparents hold a high position and tend to play a key role in most aspects of family decision making (Georgas *et al.*, 2006). Generally, husbands are responsible for handling the family's financial matters—even if their wives are working or are independently wealthy (Georgas *et al*., 2006). Even though

there are different tribes and a variety of belief systems, respect for family, elders, authority, and tradition remains central to Saudi culture.

In terms of Hofstede's (2001) cultural dimensions, Saudi Arabia ranks very high on power distance, collectivism, masculinity, and uncertainty avoidance. This suggests that the country is characterized by high levels of inequality, substantial gender differences, and citizens who are very uncomfortable with unstructured situations; that is, they prefer stability and clarity rather than ambiguity. In terms of gender differences, men are expected to be forceful, strong, and concerned with material success, while women are expected to be more quiet, caring, and concerned with quality of life.

The Internet was introduced into Saudi Arabia in 1999. In 2005, eGovernment emerged in a major way with the government's "Yesser" strategy. Presently, almost all government ministries have their own websites even though they vary in terms of services delivered, functionality, features, and support level (Al-Nuaim, 2011). According to the *The Economist* (2014), about 60% of Saudis use the Internet, and some 25% (8 million) use Facebook. The penetration rates for various social media platforms are not high: 29% for WhatsApp and about 20% for Twitter, for example. On average, 1 in 3 Saudis uses social media regularly (Statista, 2014). However, the bulk of these users are young people between 26 and 34 years old, and the overwhelming majority are men (*Economist,* 2014). While steady progress is being made with Internet and computer technologies, computer literacy rates and poor information technology skills remain among the biggest challenges in the Arab world (Al-Fakhri *et al.*, 2009).

Section II presents a brief review of the relevant literature. Section III discusses the framework and hypotheses for the present study. Section IV describes the research methodology. Section V presents the results. Section VI discusses their practical and theoretical implications; and Section VII presents the conclusion.

II. Literature Review

As stated earlier, eGovernment generally refers to the use of information and communication technologies (ICT) to provide easy and convenient access to government information and services to citizens, businesses, and governmental units (Carter and Bélanger, 2005). From this perspective, eGovernment is seen as a powerful tool for enhancing service delivery, efficiency, and transparency of government (Kumar *et al.*, 2007; Persaud and Persaud, 2013). eParticipation, on the other hand, is often viewed as a special type of eGovernment service because it takes place on government websites or as part of eGovernment services run by government agencies (Lee and Kim, 2014; Macintosh and Whyte, 2008). Still, others regard eParticipation as field of research in its own right, given its close links to eDemocracy (Susha and Grönlund, 2012).

Classification aside, eParticipation aims to engage citizens in government decision making, planning and governance through the use of ICTs (Grönlund, 2001; Millard *et al*., 2009). The goal of eParticipation is to create ongoing dialogue between the government and citizens and among citizens on issues of public policy and governance through the use of ICT (White, 2007). The availability of tools and technologies to promote engagement and dialogue between government and citizens and among citizens is essential for eParticipation success (Ergazakis *et al.*, 2011; Kamal, 2009; Themistocleous *et al.*, 2012). Recent studies have shown that social media technologies can play an important role in promoting eParticipation since they facilitate social interactions (Bertot *et al.*, 2012; Chun and Cho, 2012; Lee and Kim, 2014), relationship building

(Shah and Lim, 2011), user-generated content, and social networking (Magro, 2012), all of which foster dialogue, engagement, and trust.

Because eParticipation can result in greater engagement and dialogue between government and citizens and among citizens, citizens are empowered to play a greater role in public policy. Citizens could become more than just consumers of government information and services; rather they could become active partners in the creation of public policy since they have the ability to suggest policies and provide input and feedback on existing or proposed policies. Along this line, Macintosh and Whyte (2008) suggest that eParticipation involves "top-down" (government-initiated) and "ground-up" (citizen-initiated) engagement, both of which are designed to empower citizens and foster greater participation in government decision making (Thomas and Streib, 2003; Zuckerman and West, 1985). Thus, e-Participation is important for both governments and citizens because it provides the opportunity for citizens to be heard by their governments and to participate in the decision making, and it allows governments to engage citizens in policy formulation and democratic processes (Ergazakis *et al*., 2011). Thus, eParticipation can be viewed as a building block in democratic decision making (Michels and De Graaf, 2010; Sæbø *et al.*, 2008).

Two recent and separate syntheses (Medaglia, 2012; Susha and Grönlund, 2012) of the extant eParticipation literature pointed to two dominant themes: the role of citizens in eParticipation processes and the influence of technologies in shaping eParticipation. Citizen-focused studies examine how citizens engage with government in terms of mechanisms, processes, and drivers (e.g., Edelmann *et al.*, 2009; Ferber *et al.*, 2006; Maier-Rabler and Neumayer, 2009; Scherer *et al.,* 2009). Some studies have also investigated the changing interactions between citizens and government (Freschi *et al.*, 2009) and what governments can do to eliminate constraints to full-fledged citizen eParticipation (Susha and Grönlund, 2012). A major finding from this stream of research is that citizens' values are among the most important factors influencing online participation (Medaglia, 2012). For instance, Lee and Kim (2014) found that citizens' trust in government facilitates active citizen-initiated eParticipation, and Medaglia (2012) found that citizens' technological competence influences their online participation.

In terms of technology-focused studies, one key finding relates to frameworks and principles for designing and managing digital platforms for eParticipation (Geldermann and Ludwig, 2007; Insua *et al*., 2008; Kim, 2005; Phang and Kankanhalli, 2008; Williams, 2010). This stream of research has evolved around two perspectives: government-initiated applications (e.g., eInformation, eService, and eVoting) and citizen-initiated processes (social networking and social media). Studies on government-initiated applications focus on the design and management of effective eParticipation systems, while studies on citizen-initiated processes focus on citizens' motivation and the subsequent effects of such participation (Susha and Grönlund, 2012). In this context, Cruickshank and Smith (2009) identified personal and social motivators that influence citizens' eParticipation, while Susha and Grönlund (2012) propose targeting citizens' personal attitudes, self-perception, and everyday-life concerns.

Another set of technology-centered research (e.g., Bochicchio and Longo, 2010; Ergazakis *et al*., 2011; Kamal, 2009; Themistocleous *et al*., 2012) explores the challenges and opportunities of a wide range of eParticipatory technologies (e.g., location-based services, webcasting, wikis, social networking services, social media, eVoting, etc). These technologies have the potential not only to enable citizen eParticipation in the policy-making process (Charalabidis *et al.*, 2010) but also to transform government-citizen interactions (Medaglia, 2012) since they make it easier for citizens to coordinate, communicate, produce, and share political power relative to traditional government institutions (Sæbø *et al.,* 2009). These technologies make citizens the principal actors

in eGovernment and eDemocracy (Medaglia, 2012). However, research on Web 2.0 platforms and tools is only now emerging (Effing *et al.*, 2011). Susha and Grönlund (2012), for example, found research on how social media shape eParticipation to be lacking.

Another key finding from technology-focused research indicates that usable and well-structured websites do encourage citizen engagement (Coleman *et al.*, 2008) but this is not always the case. Macintosh and Whyte (2008) and Trechsel (2007) reported that usable and accessible tools, technology and government websites, are not enough to ensure enhanced participation or actual inclusion in the political system. Similarly, Magro (2012) found that simply employing technology for its own sake will not result in greater citizen participation. Trust, responsiveness, competence, engagement, commitment, security, and accessibility matter; the relevance and legitimacy of the tools, content, and processes also influence eParticipation (Macintosh and Whyte, 2008; Magro, 2012). Furthermore, citizens' satisfaction with participatory platforms tends to depend on factors such as existing and anticipated government reforms, regulatory structure, and perceived managerial capabilities (Chen *et al.*, 2006).

Since eParticipation is technology mediated, researchers have investigated how the tools and technologies provided by governments facilitate dialogue between government policy makers and citizens and among citizens (Themistocleous *et al*., 2012). Research by Ergazakis *et al*. (2011) identifies a wide range of tools and technologies available for eParticipation, including chat rooms, blogs, online fora, ePetition, ePanels, eCommunities, eVoting, ePolls, eConsultation tools, decision-making tools, webcasting tools, and social media tools and platforms for interaction, collaboration, and sharing (Mislove *et al.*, 2007; Waters *et al.*, 2009). This facet of the literature review suggests that governments could facilitate eParticipation by using tools and technologies that are routinely used by citizens (Tambouris *et al.,* 2007). For example, since most people currently use mobile phones and social media regularly, governments should use these technologies to engage with citizens. While this assertion *sounds* reasonable, there is little empirical evidence to support it—especially in the context of developing and Arab countries. Indeed, current evidence suggests that these technologies do not automatically promote eParticipation (Betancourt, 2005) since other non-technical factors may influence such decisions (Chun and Cho, 2012).

Our literature search on eGovernment and eparticipation in Saudi Arabia turned up only a handful of studies. The themes covered by the studies are eGovernment adoption drivers, obstacles and challenges (Alateyah *et al*., 2013; Alshehri *et al*., 2012), information technology usage (Abanumy and Mayhew, 2005), number, types, and benefits of eGovernment services offered (Al-Fakhri *et al*., 2009), evaluation of eGovernment services (Al-Nuaim, 2011), and managing eGovernment implementation projects (Hamner and Al-Qahtani, 2009). It is noted that none of the studies examined eParticipation. Nevertheless, they are included in this review in order to provide a clearer portrayal of the eGovernment context in Saudi Arabia.

The studies on Saudi Arabia noted that eGovernment was driven by a desire for the government to improve services, reduce expenditures, meet public expectations, improve relationships with citizens, and assist with economic development (Al-Fakhri *et al*., 2009; Al-Nuaim, 2011, Alshehri *et al*., 2012). For instance, the government-initiated "Yesser" program was designed to achieve continuous eGovernment growth and development within the country (Al-Fakhri *et al*., 2009; Alshehri *et al*., 2012). Today, most government agencies have their own websites, but implementation and adoption of eGovernment services are still in the early stages. Furthermore, there are substantial variations in the level of functionality, services, and features offered by the different ministries (Al-Nuaim, 2011). It appears that non-technical factors, such as

human resources, administrative skills, and economic considerations, are the principal barriers to eGovernment implementation. According to the United Nations (2010), in spite of the existence of national policies and strategies to foster the growth of ICT in Saudi Arabia, there is resistance to the Internet among some community leaders; this tends to impede progress.

In terms of the factors that influence eGovernment adoption by citizens, Alateyah *et al*. (2013) identified several factors, including awareness, quality of service, computer and information literacy, technical infrastructure, website design, security, and culture. According to Alshehri *et al*. (2012), the most important barriers were lack of awareness of eGovernment services, lack of trust in using eGovernment services, resistance of government employees to use eGovernment, lack of technical support from government website support teams, weak ICT infrastructure, and the availability and reliability of Internet connection. Based on these studies, it seems that three factors drive the adoption of eGovernment by Saudi citizens: attitudinal (e.g., trust, awareness, culture, security, and employee resistance), technical (e.g., ICT infrastructure, website design and management), and structural considerations (e.g., computer availability and information literacy). These studies also pointed to the relevance of two important demographic variables, namely, age and gender, not only for eGovernment services (Alateyah *et al*., 2013; Alshehri *et al*., 2012) but for online services as well (Al-Ghaith *et al*., 2010).

III. Conceptual Framework and Hypotheses

The question of what drives eParticipation has been addressed from various theoretical perspectives, including technological, social, individual (demographic and socio-economic), and psychological (Lee and Kim, 2014). For instance, as discussed above, since eParticipation is based on ICTs, researchers have explored the link between the availability of tools and technologies and eParticipation. Similarly, since many researchers view eParticipation as a new technology the adoption of which depends on an individual's assessment of its perceived usefulness and ease of use, its relative advantage and compatibility, they have used various combinations and extensions of technology adoption models such as the Technology Adoption Model, Diffusion of Innovations Model, and the Unified Theory of Acceptance and Use of Technology (UTAUT).

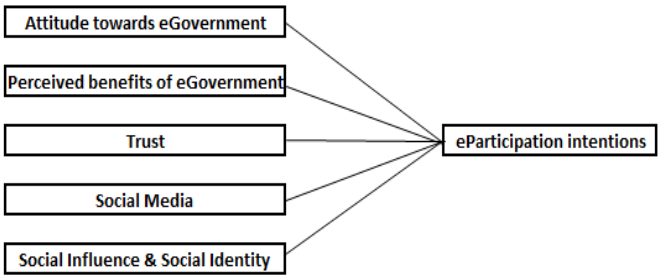
Another stream of research examines how citizens' demographic and socio-economic characteristics, such as race, gender, age, income, and education, influence their eParticipation (Lee and Kim, 2014; Thomas and Melkers, 1999; van Dijk *et al.*, 2008). Yet another line of research focuses on citizens' individual psychological characteristics (Thomas and Streib, 2003), such as self-efficacy (e.g., political efficacy, Internet efficacy, and technological efficacy) and personality (Edelmann and Cruickshank, 2012; Lee and Kim, 2014). Further, since eParticipation involves social interactions in order to promote dialogue and engagement among citizens and governments, researchers have used various social constructs in their analyses, including social norms, social identity, social influence, and social capital (Sæbø *et al*., 2009).

In terms of theoretical models applied to the study of eParticipation, Susha and Grönlund (2012) identified more than two dozen theories drawn from political science, communications, sociology, public administration, information systems, and eGovernment. They observed that theories developed specifically within the eParticipation field and not borrowed from any specific discipline are lacking and needed. Macintosh and Whyte (2008) and Funilkul and Chutimaskul (2009) represent early attempts at developing eParticipation frameworks that combine elements from the three key dimensions of the eParticipation field: stakeholders, the environment, and technologies.

The model proposed for this study was developed based on insights gleaned from the preceding literature review. Cruickshank and Smith (2009) and Susha and Grönlund (2012) posit that personal attitudes and social motivators influence citizens' eParticipation. Similarly, the literature extensively discussed the potential of social media and other collaborative platforms to shape eParticipation, but there is little empirical evidence of this relationship. In addition, several researchers cautioned that the availability of participatory tools and platforms does not automatically result in enhanced eParticipation unless there is also trust. Consequently, factors considered in this study were chosen to reflect personal and social motivators (attitudes, perceived benefits, trust, and social influence) and the technological aspect (social media) that could transform eParticipation between governments and citizens and among citizens. Moreover, these factors have received little empirical testing, particularly with respect to developing and Arab countries.

Figure 1 depicts the conceptual model employed in the present study, suggesting that users' eParticipation intentions are influenced by their attitudes towards eGovernment, the perceived benefits of eGovernment participation, their level of trust of the government, the extent to which social media is used for eParticipation, and social influence and identity. The relationship between each of these variables in the model and eParticipation intentions is described below.

Figure 1: Conceptual Model of this Study



A. Attitude Towards eGovernment

Attitude has been shown to have a positive influence on adoption intentions in both the technology acceptance and eGovernment literatures (Davis *et al.*, 1989; Persaud and Persaud, 2013). An attitude is a person's enduring evaluation of his or her feelings about and behavioural tendencies toward an object or idea. Attitudes are learned and long lasting, and they might develop over a long period of time, though they can also abruptly change (Grewal *et al.*, 2012). In terms of eParticipation, users' attitudes may be shaped by their beliefs regarding the necessity to participate in eGovernment, the extent to which they feel comfortable participating via online channels, and whether they believe that eGovernment is increasingly becoming the preferred way to communicate, interact, and transact with the government. Furthermore, the level of eGovernment transparency may also influence participation rates (Relly and Sabharwal, 2009). The perceived ease and usefulness of eGovernment may also engender greater eParticipation. Generally, more positive attitudes toward eGovernment will likely lead to greater eParticipation. Thus, we propose the following hypothesis:

Hypothesis 1: Positive attitudes toward eGovernment will enhance eParticipation.

B. Perceived Benefits of eGovernment

Several recent studies have shown that the perceived benefits of eGovernment are positively associated with eGovernment adoption (Carter and Weerakkody, 2008; Jaeger and Bertot, 2010; Persaud and Persaud, 2013). Benefits of eGovernment participation could occur at both the individual and social levels. Users may decide to use eGovernment based on whether or not they believe their input has any influence on government policy and decision making, whether there are tangible benefits to them personally or to the wider society, and whether there are drawbacks from participating via online channels. In the case of eGovernment adoption, the literature indicates that perceived personal and social benefits influence adoption rates positively (Persaud and Persaud, 2013). A similar relationship might exist in the case of eParticipation. Thus, the following hypothesis is proposed:

Hypothesis 2: Perceived benefits will be positively related to eParticipation.

C. Trust

Trust in government is broadly defined as the extent to which citizens believe that government works in their best interest (Cleary and Stokes, 2006). When citizens do not trust in government, they are likely to perceive government policies as harmful, to distance themselves from government, to resist government policies and programs, and to lower their expectations of how government will treat them in the future (Kim, 2005). Such cynicism toward government tends to decrease citizens' interests in participation in public administration (Berman, 1997; Kim, 2005). Citizens' distrust in government often occurs during their conversation and consultation with government officials.

On the other hand, citizens' trust in government signals that government will respond to their needs and care for their best interests. Also, trust in government reflects citizens' willingness to comply, cooperate, adopt, and support government policies and innovative programs (Bélanger and Carter, 2008; Cooper *et al.*, 2008). For example, research found that citizens' trust in government increases the possibility of adopting innovative eGovernment services (Bélanger and Carter, 2008). Moreover, when citizens trust government, they are likely to show greater interest in government. Thus, given the fact that citizen-initiated eParticipation often requires citizens' commitment to participation in public affairs, their willingness and interest can be expressed as a form of active participation in policy decision-making processes (Bélanger and Carter, 2008; Cooper *et al*., 2008). Therefore, we expect that greater trust of government will positively affect eParticipation. Therefore, the following hypothesis is proposed:

Hypothesis 3: Trust will be positively impact eParticipation.

D. Social Media

Social media facilitates the sharing and exchange of user-generated content (Kaplan and Haenlein, 2010) and promotes collaboration, participation, and engagement among users. Users have the ability to connect with each other and to form communities to socialize, share information, or achieve common goals or interests (Magro, 2012). Social media can be empowering to its users

as it gives them a platform to speak. It allows anyone with access to the Internet the ability to publish or broadcast information inexpensively in near-real time, effectively democratizing media (Magro, 2012).

Government use of social media is often highlighted as a good example of open government, which builds on principles of citizen centricity and information transparency (UN, 2012). According to the United Nations (UN, 2012), government agencies are currently using social media for improving public services, reducing costs, and increasing transparency. Through these media, they can inform citizens, promote their services, seek public views and feedback, and monitor satisfaction with the services they offer so as to enhance their quality. Furthermore, social media allows two-way communication in real time; government agencies can quickly engage citizens as co-producers of services, not just as passive recipients (UN, 2012). In expectation of a positive relationship between social media and eParticipation, we propose the following hypothesis for testing:

Hypothesis 4: Social media use will enhance eParticipation.

E. Social Influence and Social Identity

Social influence and identity theories posit that people are susceptible to social influences, which, in turn, positively affect their behavioural intentions (Tajfel and Turner, 1986). Mael and Ashforth (1992) argue that people often define themselves in terms of certain group memberships, and when they strongly identify with a group, they have positive attitudes towards the group and may even promulgate a positive group image (Bhattacharya *et al*., 1995). Therefore, the most important groups are those with a high level of self-relevance, since they form an individual's social identity. Social identity refers to "the individual's knowledge that he [or she] belongs to certain social groups together with some emotional and value significance to him [or her] of this group membership" (Tajfel 1978, p. 31). Thus, social identity is a valid concept for explaining the relationship between an individual and his/her social environment (Tajfel, 1978). These social identities are common in various aspects of life—people see themselves as being part of a country, political movement, elite group, or progressive organization. Moreover, individuals may see some benefits from adhering to social norms and behavioral expectations associated with a social group (Andorfer and Liebe, 2013; Bartels and Hoogendam, 2011). From this perspective, individuals who share the belief that participating in eGovernment is "the way of the future," may want to identify with people whom they view as early adopters of this innovation. Simonson and Nowlis (2000) contend that the adoption of innovation is a socially accepted way of making a unique impression.

Another important determinant of an individual's behaviour is the influence of others (Bearden *et al.*, 1989). Langley *et al.* (2012) show that social contagion—the process by which individuals influence each other to adopt innovations—plays an important role in their adoption decisions. The social influences of family, friends, co-workers, peer groups, and influential bodies can convey information and activate emotional reactions through social persuasion (Bandura, 1986). Furthermore, people often make choices because they want to impress others or raise their social status (Foxall *et al.*, 1998), which may lead to social rewards and social differentiation, both of which stimulate innovation adoption (Fisher and Price, 1992). Noting that eGovernment and eParticipation are major innovations in the design and delivery of government services and for engaging citizens in the political and democratic processes of governance, we expect social

influences and social identity to positively influence eParticipation intention. Therefore, the following hypothesis is advanced:

Hypothesis 5: Social identification and influence will positively impact eParticipation.

IV. Research Methodology

This study is based on an online survey conducted in June 2014 of 200 hundred Saudi citizens and residents. An email list comprising 900 potential participants was created from various public sources as well as from the researchers' professional and social contacts. Participants were sent an email inviting them to participate in the study. The survey link was also posted on social media sites in Saudi Arabia (e.g., Facebook, LinkedIn, and Twitter). A total of 200 completed responses were received within two weeks of launching the survey, and these responses are analyzed and reported in the present study.

The survey instrument consisted of a series of 5-point Likert scale questions for each of the constructs in the model. We also employed a set of demographic questions that delved into respondents' computer and social media efficacy. The items for each construct were drawn from various published scales but were modified to suit the context of this study. For instance, the eParticipation intention construct consisted of items that sought respondents' intentions with regards to use of government websites to receive and share information, to communicate with the government, to participate in public policy discussions, and to indicate their preference for face-to-face interactions with the government sources. In terms of social media, respondents were asked to indicate their degree of awareness of various tools that promote dialogue with the government, their level of comfort interacting with the government through social media, and whether they see the need to interact with the government through social media. With regards to social influence and social identity, we employed a series of statements seeking their opinions on whether eParticipation might be influenced by family, friends, and coworkers and whether participation results in a sense of belonging to a forward-thinking group. In terms of the trust construct, respondents were asked to express their views on whether the government could be trusted to keep information confidential and whether such concerns might discourage their own eParticipation. Attitudinal items sought their views on the present role of government in encouraging eParticipation and ways in which government could improve their functionality. Finally, the construct of perceived benefits of eGovernment focuses on savings in terms of time, money, and effort as well as improvements in service quality, reductions in bureaucracy, and increases in eParticipation.

Two versions of the survey (English and Arabic) were made available to participants. To ensure equivalency of the two versions, the procedure went as follows. The survey instrument was first created in English and then translated into Arabic by three native Arabic graduate students who are fluent in both English and Arabic. Discrepancies between the three translations were discussed with the researchers and translators and a final Arabic version was determined. The Arabic version was then given to two other students to translate back into English. The translated English version was compared to the original English version, and only a few minor editorial changes were identified.

Table 1 presents a profile of the respondents. As can be seen, the sample consists of more women than men, the majority being fairly young (under 35 years) and almost equal proportion of employed individuals and students (about 36%). Homemakers make up 22% of the sample. From a technological perspective, it is noted that the overwhelming majority of respondents indicated

that they own a computer and a smartphone, and do have Internet access. The majority also uses social media (Facebook, Twitter, YouTube, Instagram) on a regular basis. Based on these statistics, our sample of respondents can be characterized as being primarily a young and tech-savvy group.

Table 1: Demographic Profile of Respondents (n=200)

Characteristics	Items	%
Age	18–24	32.0
	25–34	50.0
	35–44	11.5
	45–54	6.5
Gender	Male	23.0
	Female	77.0
Employment Status	Student	36.5
	Employed	35.0
	Unemployed	6.5
	Homemaker	22.0
Education	High School/College	31.0
	Bachelor's Degree	50.0
	Graduate Degree and Professional	18.5
Annual Income (Saudi Riyals)	Less than 25,000	47.5
	25000–49999	19.0
	50000–99,999	14.0
	Over 100,000	19.5
Own a computer and Smartphone	Yes	96.5
Knowledge of Internet	Very knowledgeable	43.0
	Knowledgeable	20.0
	Enough to get by	27.5
	Very little knowledge	9.5
Social Networks	Twitter, Facebook, YouTube, LinkedIn	90.5
	Others	9.5
Social Media Use/Hours per week	Less than 5 hours	40.0
	5 to 10 hours	40.0
	More than 10 hours	22.5

V. Results

The data were analyzed using factor, correlation, and multiple regression analyses. Factor analysis was used to determine the dimensionality of each construct. The reliability and validity of the constructs resulting from the factor analysis were evaluated before they were used in the regression analysis. Reliability was assessed using Cronbach's alpha, where the threshold for acceptable reliability is 0.70 (Nunnally, 1978). As shown in Table 2, the reliabilities for our constructs exceeded this threshold, ranging from 0.72 to 0.88. The high inter-correlations in Table

2 provide evidence that the items converge around their respective constructs, which indicates convergent validity (Campbell and Fiske, 1959). Discriminant validity was assessed by examining the extent to which the scales of the constructs overlap, based on the widely used method proposed by Campbell and Fiske (1959). As shown in Table 2, the values range from 0.04 to 0.64, which is well below the commonly used threshold of 0.85 (Campbell and Fiske, 1959). Thus, it is concluded that there is adequate discriminant validity, and the constructs are theoretically different.

Table 2: Correlation, Reliability, and Validity

	Trust	SI	SM	AeG	PBeG
Trust	1				
SI	.500** (.59)	1			
ePSM	.416** (.49)	.468** (.50)	1		
AeP	.545** (.64)	.602** (.64)	.457** (.49)	1	
PBeG	.227** (.27)	.048 (.05)	.245** (.26)	.030 (.04)	1
Reliab.	.73	.87	.88	.72	.79
Validity, $V = r_{xy} / \sqrt{r_{xx} * r_{yy}}$. Values are shown in parenthesis; all are below .80, the recommended threshold.					

SI = social identity; ePSM = eParticipation via social media; AeP = attitude towards eParticipation; PBeG = perceived benefits of eGovernment.

Once the reliability and validity of the constructs were established, multiple regression analysis was undertaken to determine the relationship between the dependent variable (eParticipation intention) and the seven independent variables (trust of the government, attitude towards eParticipation, eParticipation through the use of social media, social influence and identity, and perceived benefits of eGovernment and two demographic variables—age and gender). The other demographic variables—education, income, and employment status were not statistically significant, and, therefore, they were removed from the final model. It is noted that the lack of significance of these variables does not necessarily imply that they are not important or relevant; it may simply indicate that they do not provide additional explanation to that provided by the statistically significant variables (Stevens, 2009). The results of the regression analysis are shown in Table 3. The results indicate that trust, social media, social influence and identity, and attitude towards eParticipation are all statistically significant and that they positively influence eParticipation intentions as hypothesized. However, it was surprising that *perceived benefits* of eParticipation were negatively related to eParticipation intentions. This may be because the benefits of eParticipation are more apparent at a social level rather than at the individual level.

Both demographic variables (age and gender) are statistically significant, but age is positively related and gender is negatively related to eParticipation intention. This suggests that, as individuals become more mature, they are more likely to engage with the government in public policy via online channels. The negative relationship between gender and eParticipation intentions is somewhat counter-intuitive and inconsistent with Siddiqui (2008) and Al-Ghaith *et al*. (2010), who reported a positive relationship. Based on the reasoning that Saudi Arabia's culture and tradition pertaining to women are more conservative (OpenNet Initiative, 2004), and given the

restrictions on the movement of women unaccompanied by a male relative, Siddiqui (2008) suggested that women would likely prefer to achieve their needs from home through the Internet.

Here, we contend that while the findings and reasoning offered by Siddiqui (2008) and Al-Ghaith *et al*. (2010) may apply to online commerce, they may not be true for eParticipation. Online shopping is geared towards satisfying personal needs for products and services, while eParticipation is perceived as being more involved in the political-, democratic-, and policy-making processes of government. Even though eParticipation is done virtually, women may be less inclined to participate, particularly if they believe that their participation may not remain anonymous and there are risks of a backlash. This line of reasoning is consistent with long-held Saudi Arabian tradition in which matters of politics, governance, democracy, and policy making are seen as being the purview of men. Thus, merely enabling women to participate by providing online channels may be inadequate to obtain their participation. This finding suggests that significantly more needs to be done by the government to change perceptions and to signal that women can participate equally in the political process of their country.

Table 3: Regression Model: Intention to Participate in eGovernment

	β	S.E	t-	Sig. t	VIF
Constant	.93	.43	2.21	.03	
ePSM	.13	.08	2.05	.04	1.34
Trust	.33	.07	5.23	.00	1.84
SI	.27	.03	3.93	.00	1.91
AeP	.16	.07	2.28	.02	1.86
PBeG	-.13	.05	-2.40	.01	2.07
Age	.12	.09	2.18	.03	1.14
Gender	-.22	.21	-3.13	.00	1.19
R^2 = 53.4; F-value = 30.93 Sig F = 0.000					

VI. Discussion and Implications

The goal of this study was to identify the drivers of eParticipation among the citizens and residents of Saudi Arabia. Given the paucity of empirical evidence on this issue in the context of Saudi Arabia, and given the lack of adequate theoretical models of user participation, a conceptual model was developed and tested. The findings of this study have both research and policy significance. From a research perspective, this study demonstrates the statistical significance and theoretical importance of factors—social media, social identification and social influence—that have been discussed in the conceptual literature but have not been subject to empirical testing, particularly in the context of Arab countries. From a policy perspective, the results point to several important issues that need to be addressed in order to increase the pace of eParticipation. These are discussed below.

The results show that trust of and confidence in the government are critical factors in influencing Saudi citizens' decision to eParticipate. Also, the extent to which they believe the feedback they provide is kept confidential and is used only for the intended purposes will determine the extent of their participation. Respondents are deeply concerned about the misuse of information by the government and negative consequences that might ensue for them personally. The perceived lack of security of the online channel is also a contributory factor; the more secure

the channel, the higher the likelihood of eParticipation. Essentially, governments need to demonstrate in visible ways that they intend to interact with its citizens in a responsible and transparent manner. In Saudi Arabia, where tradition, tribal relations, religion, and a conservative culture dominate, building trust with citizens is of paramount importance. The finding by Shah and Lim (2011) that citizens' distrust of government often occurs during conversation and consultation with government officials may be instructive. In the context of trust, the finding by Alshehri *et al*. (2012) that resistance from government employees to use eGovernment, lack of technical support from government website support team, weak ICT infrastructure, and the availability and reliability of Internet connection may also be instructive in terms of developing appropriate responses.

From a policy perspective, it is clear that the Saudi government can increase citizens' engagement by demonstrating respect for anonymity and guaranteeing use of information only for intended purposes. This finding also aligns with the recommendation of Shah and Lim (2011) that such demonstration will help enhance citizens' perceptions of government's trustworthiness, a process that is likely to occur through word-of-mouth.

The second important factor is social influence and identity. These factors pertain to the influence of family, friends, colleagues, co-workers, and others in getting people to engage with the online channel. Also, it seems that people believe that eParticipation puts them in a select group of forward-thinking people. This factor has received very little attention so far in the theoretical literature on eGovernment, and the finding observed in this study provides a basis for further testing and inclusion in future studies. The findings regarding social identification and influence in this study are consistent with technology acceptance literature, which shows evidence of a positive relationship between peer pressure, social norms and behavioral intentions.

Social identity and social influence are particularly relevant to the theory of eParticipation in light of its close link to eDemocracy. Recent events in the Middle East (e.g., the Arab Spring) show that social contagion is a major force for change since it tends to galvanize people around common causes. Even people who may not initially be active become so—with powerful and compelling appeals from friends, family, peers, and even strangers. This variable, having received little attention in the eParticipation literature, needs further investigation. From a practical perspective, this finding suggests that the Saudi government should probably initiate programs and promotional activities to boost eParticipation. The government may also want to tap into specific groups of people who are considered to be opinion leaders to get them to become spokespeople for eParticipation programs.

Attitude towards eParticipation is another key factor that motivates people to engage with the government via online channels (Persaud and Sehgal, 2005). Generally, participants in the study had a positive attitude towards eParticipation and have given the government a good rating for its efforts to encourage eParticipation. They also believed that eParticipation can have substantial impacts on improved governance and policy as well as the process of decision making. The positive impact of attitudes on intention aligns with the TAM model, which posits that attitudes affect intentions (Davis *et al*., 1989). Although several eParticipation studies have found that citizens' attitudes influence their decision to engage with the government via online channels, there is a dearth of empirical studies outside of the technology acceptance literature that investigate how these attitudes are formed. Generally, technology acceptance models postulate that two key features of a technology—perceived usefulness and perceived ease of use—are primary drivers of attitudes toward a technology. However, given that most eParticipation technologies require fairly limited technological knowledge and skills to use, it is important to explore other personal and

social motivators of attitudes. From a practical perspective, the findings regarding attitudes towards eParticipation lend support to the notion that the government is doing a relatively good job and that these efforts should be continued.

Our respondents recognize that significant benefits can be derived if the government uses social media to communicate and interact with them. These benefits include more efficient policy and decision-making processes and outcomes and greater engagement of citizens in government initiatives and priorities. This perception is in accord with the pervasive thinking in the literature regarding the transformative potential of social media platforms. Unfortunately, participants do not see the need to interact or perhaps do not feel comfortable interacting with the government through social media. The lack of interest or discomfort in engaging with government via social media has profound implications for eParticipation development in Saudi Arabia. The finding suggests that regardless of the level of government investment in social media, uptake may remain low. That is, the availability, design, access, or usefulness of social media matter little when trust in government is lacking. This is in stark contrast to the findings and arguments advanced in the literature that emanates from the developed world, which has very different institutions and political systems.

Uncovering the root causes for such negative attitudes towards a potentially empowering technology need further investigation and attention from policymakers. One possible explanation for this result may be that participation through social media is not entirely anonymous, and this may dissuade people from participating for fear of negative consequences. It may also be related to the conservative nature of Saudi Arabia's culture and to the so-called "middleman paradox" (Persson and Lindh, 2012), where the same people who are responsible for new forms of eParticipation explicitly or implicitly oppose these reforms. Resistance to the Internet from some community leaders (Al-Soma, 2011), combined with resistance from government employees to use eGovernment, and inadequate technical support from government websites (Alshehri *et al*., 2012) could reinforce perceptions of the "middleman paradox." Engaging citizens in public policy decisions through eParticipation technologies and initiatives are not without risks, particularly without concomitant changes in the way government operates. Poor understanding of the risks and inadequate training could trigger responses such as the middleman paradox. From a policy perspective, the government of Saudi Arabia needs to assess the breadth of changes required and the associated risks and develop strategies for managing these without major disruptions to government operations.

Clearly, social media has the potential to change the nature of government policy making, governance, and institutions in unpredictable ways despite the best efforts at anticipating and planning. The evidence suggests that using social media technology with mobile technology, which is quickly becoming the norm in most developing countries, requires that government structures, institutions, and decision making be modified to accommodate citizens' heightened need for responsiveness, transparency, and engagement.

From a theoretical perspective, this study is among a handful that has examined the influence of social media on eParticipation rates from an Arab culture, the socio-cultural norms of which are vastly different from those of Western cultures. From a practical perspective, the findings concerning the attitudes of people towards the use of social media to foster eParticipation imply that the government ought to devote more efforts to get more people to feel comfortable using social media for eParticipation. In addition, the negative relationship between gender and eParticipation intentions, although seemingly incongruent with prior research, provides an alternative formulation that is specific to eParticipation. However, further testing of this

relationship is warranted, for example, by comparing with other developing countries in which the long-standing tradition is for women to participate in the political, democratic, and governance processes of the country.

VII. Summary and Conclusions

This study advanced a model of eParticipation and tested it using data collected from an online survey of 200 participants from a developing country, Saudi Arabia. This country was chosen because it has made significant investments and progress in eGovernment over the last decade and is viewed as a leader in the Arab world. In addition, the socio-cultural context of Saudi Arabia is vastly different from that of the Western, developed world, on which most of the empirical extant literature on eParticipation is based. Further, research on eParticipation in Saudi Arabia is virtually nonexistent, particularly research relating to users as opposed to the technological aspects of fostering eParticipation.

The results of this study indicate that four variables positively influence eParticipation intentions: trust of the government, attitude towards eParticipation, eParticipation through the use of social media, and social influence and social identity. Perceived benefits of eGovernment were statistically significant but negatively related to eParticipation intention. Moreover, both age and gender influence the level of eParticipation—age positively and gender negatively. These findings suggest that as people become more mature, they are more willing to participate in the governance of the country via online channels. Also, it appears that women are not likely to eparticipate more because of traditional practices of the role of women in political, governance, and democratic processes than because of the opportunity to participate or ease of use of the technology. Such participation could be increased if people feel they can participate anonymously, if the information they provide will not be used against them but only for the stated purpose, and if they can observe the influence of their eParticipation on policy- and decision-making processes. Moreover, participants have a favorable attitude towards the progress and efforts made by the government to encourage greater eParticipation. Finally, while participants recognize the benefits of interacting with the government through social media and that social media is likely to play a major role in future efforts, they currently do not see the need to use social media or are not comfortable using social media to engage with the government.

From a theoretical perspective, this study adds to the emerging literature on eParticipation focusing on developing countries, and, more specifically, Arab countries. The study has also proposed and empirically tested a model of eParticipation that provides fertile grounds for further testing in other contexts and socio-political environments. From a practical perspective, the findings reported here could help shape the strategies and tactics the government could use to increase the rate of eParticipation in Saudi Arabia.

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The Journal of Business Inquiry 2015 14, Issue 1, 23-40
http:www.uvu.edu/woodbury/jbi/articles
ISSN 2155-4072

Saving-Investment: A Spacey Relationship

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The objective of this paper is to show that saving-investment regressions are biased toward capital immobility because of the failure to control for the endogeneity of investment rates across countries. Using a spatial autoregressive lag process, we show the saving coefficient is significantly lower and statistically insignificant from zero for small open economies. We assume investment is correlated using the differences in saving rates across countries, i.e. high saving countries are more likely to invest in low saving countries, which will increase the correlation between investment rates across countries.

Keywords: Saving, Investment, Feldstein-Horioka Puzzle, Spatial Autocorrelation, Capital Mobility

JEL Classification: C31, C33, F32, F41

I. Introduction

There has been a tremendous level of debate surrounding the usefulness of the Feldstein and Horioka (1980) result that shows a large degree of capital immobility across OECD countries. The Feldstein-Horioka Puzzle (hereafter FH) stems from finding a high correlation between domestic saving rates and national investment rates for a sample of 16 countries.[1] This result has spurred a great deal of research and controversy over the validity of using a simple two variable regression to measure capital mobility. Past researchers who have used the saving and investment regression to measure capital mobility have ignored relevant variables including interest rate differentials, political risk, and geographic proximity to explain capital mobility. Nonetheless, more than 30 years have passed since the original result, and the saving-investment (SI) relationship is still being applied as a measure of capital mobility. Given the difficulty of measuring the capital mobility, many researchers still consider the SI regressions an informative but incomplete measure of capital mobility.

The SI puzzle started as an OLS regression where domestic saving rates were regressed on national investment rates. Under the assumption of perfect capital mobility, saving should flow to countries offering the highest returns and have little correlation with domestic investment rates. For example, if one country experiences a positive shock to investment, marginal product of capital will increase leading due to an increase in capital inflows. Domestic investment will increase while saving will remain relatively unchanged; the correlation between both variables should decrease.

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[1] FH estimates $\frac{I}{Y}=\alpha+\beta\frac{S}{Y}+e_i$, where β is referred to the saving-retention coefficient. FH found β=0.89, statistically insignificant from 1, which they interpreted as domestic saving being a perfect predictor of national investment therefore capital must be immobile.

Within the context of the SI regression this country would have a lower saving coefficient. However, if capital markets are closed, countries will need to finance new investment through an increase in domestic saving.

It is this logic that motivates our empirical model. Looking across developed economies, countries that generally offer a similar risk profile, we expect saving rate differentials across countries to be a key factor explaining capital mobility. As capital mobility increases we expect funds to be channeled from high saving countries to low saving countries. Figure 1 presents saving and investment rates expressed as a percent of gross domestic product (GDP) averaged by year over 26 OECD countries.[2] Additionally, Table 1 presents the correlation between saving and investment rates across decades. From 1950 through 1979 both variables moved together with a correlation of 0.950, but starting in the 1980's average saving rates throughout OECD countries began to increase while investment rates remained relatively constant. The simple correlation from 1980 through 2009 fell to 0.685, and was considerably lower in the 1980s and 1990s.The high SI correlation has persisted in the literature despite advances in econometric testing, longer time spans, and better theoretical models.[3] In this paper we add to the literature by proposing a spatial autoregressive (lag) process which assumes that a country's investment rate is dependent on other countries' saving rates. Standard neoclassical growth theory shows that saving is more likely to flow from a high saving country into a low saving country. Countries with lower saving rates offer higher rates of return (seen through a higher marginal product of capital). If capital markets are closed, saving and investment rates will be equalized within countries and cause a significant divergence in investment rates across countries. Instead, investment rates are relatively constant across countries. Using spatial modeling our results provide evidence that investment rates are equalized across countries whereas saving rates differ significantly.

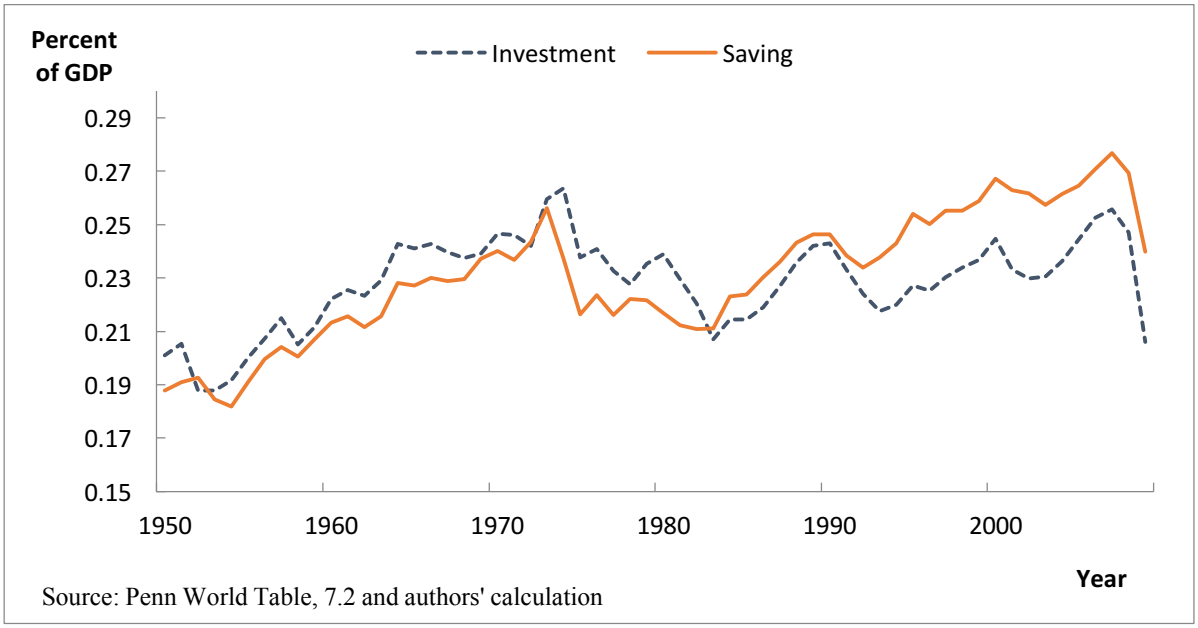
Table 1: Decade Correlations, 1950-2009

Decade	Correlation
1950-59	0.809
1960-69	0.903
1970-79	0.763
1980-89	0.527
1990-99	0.451
2000-09	0.973
1950-79	0.950
1980-09	0.685
1950-2009	0.729

[2] Data are from the Penn World Table, version 7.2. Countries include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.

[3] See Apergis and Tsoumas (2009), and Coakley *et al*. (2004) for a more thorough review of the literature.

Figure 1: Investment and Saving Rates Averaged Across Countries, 1950-2009



Source: Penn World Table, 7.2 and authors' calculation

We show the correlation between saving and investment rates is significantly lower after controlling for the endogeneity of investment rates across countries. In some cases, especially for small open economies, the SI regressions show evidence of perfect capital mobility. These results are also robust to the inclusion of country and time fixed effects following Krol (1996) and Jansen (1996). The rest of this paper is set out as follows. Section II reviews the relevant literature, Section III reviews our econometric approach, Section IV discusses the data and results, and Section V concludes.

II. Literature Review

Since FH's seminal paper, the relationship between domestic saving and investment has been examined from numerous perspectives (e.g. Dooley *et al.* (1987); Tesar (1991); Taylor and Sarno (1997); Glick and Rogoff (1995); Coakley *et al.* (1998); Obstfeld and Rogoff (2000); Corbin (2004); and Bryne *et al*. (2009)). Most of these papers either argue that saving and investment can be correlated even if capital is mobile, or offer alternative explanations for the high correlation found by Feldstein and Horioka (1980). Recently, Bai and Zhang (2010) show that the cross-sectional relationship between saving and investment rates measures the relationship of financial frictions, and that after controlling for these frictions, the relationship goes to zero. The basic approach of these studies stems from FH's estimation of the relationship between domestic investment and saving:

$$\frac{I}{Yi}=\alpha+\beta\frac{S}{Yi}+\varepsilon_i \qquad (1)$$

where, for country i, $(I/Y)_i$ is domestic investment as a share of gross domestic product (GDP), and $(S/Y)_i$ is domestic saving as a share of domestic GDP. FH originally finds β equal to 0.89 for a sample of 16 OECD countries spanning 1960 to 1974.

The earliest extensions focused on applying the SI regressions to varying datasets controlling for time, country size, and trade openness. Originally, proposed by Baxter and Crucini (1993) and Tesar (1991), relatively small economies with a large exposure to trade should have a significantly lower SI correlation. Smaller economies are more dependent on foreign capital, which weakens the domestic SI relationship. Subsequent work has since expanded Equation (1) to include panel estimators (see Sinn (1992), Jansen (1996), Krol (1996), and Kollias *et al.* (2008)) and times series techniques [see Miller (1988)]. However, regardless of the approach taken, the focus of the literature is on β, named the saving-retention coefficient. A saving-retention coefficient near one indicates a high correlation between domestic saving and investment, which implies that capital may not be mobile across international borders as domestic saving is retained in the home country.

A number of explanations for the high correlation between domestic saving and investment have been offered. The most widely accepted explanation is that countries face a long-run solvency constraint within their current account balance. Saving less investment is approximately equal to a country's current account balance. In the short run, countries can sustain a current account imbalance, but over time both variables move together to eliminate any deficit or surplus. As such, Jansen (1996) shows that the simple ordinary least squares (OLS) model originally estimated by FH is effectively measuring a binding long-run solvency constraint, and that by using long-term data, average saving and investment rates should be equal. Jansen then uses a vector error correction model to show that saving and investment rates are cointegrated, implying a stationary current account. Nevertheless, the short-run SI coefficient can be used as a measure of capital mobility when using annual data.

Jansen's work has since opened the door for research testing the short- and long-run relationships between saving and investment rates as they apply to both capital mobility and current account dynamics, respectively. More recently, Pelgrin and Schich (2008) and Kim *et al.* (2005) use a dynamic panel error correction model to show that the relationship is significantly weaker in the short run, but is highly correlated in the long run. Similarly, Herwartz and Xu (2010) use a functional coefficient model to show that trade openness, age dependency ratios, and government consumption affect the saving coefficient in the long run. Georgopoulos and Hejazi (2009) add to this literature by incorporating a time trend into the SI regressions, showing that the home bias has significantly weakened over time. Finally, Fouquau *et al.* (2008) use a panel threshold smoothing process and find that varying levels of trade openness, country size, and current account balances impact the saving coefficient, while Evans *et al.* (2008) use a time-varying coefficient approach to show that the saving-retention coefficient is unstable over time.

Despite the large amount of research devoted to the FH puzzle, we believe one omission in the literature is the failure to control for the endogeneity within investment rates across countries. In particular we show that investment rates are positively correlated across countries, and that the failure to adequately control for this endogeneity biases the saving coefficient upward. Debarsy and Ertur (2010) assume investment is correlated across countries, conditional on proximity. Accordingly, the greater the proximity of two countries, the greater is the level of capital flows between these countries. However, given the efficiency of global financial markets, there is no reason to suspect that capital will always flow to a neighboring country. For example, the United States receives large amounts of capital inflows from Germany, Luxembourg, Norway, and Switzerland. As such, instead of weighting investment rates by geographic proximity as is common in the literature [e.g. Baltagi *et al.* (2007); Blonigen *et al*. (2007); Bobonis and Shatz (2007); Coughlin and Segev (2000); and Garretsen and Peeters (2009)] we assume that investment rates

between countries have a greater correlation with countries that have a large difference in saving rates, rather than by spatial proximity.

III. Empirical Methodology

In this paper, we add to the aforementioned literature by recognizing the implicit assumption underlying capital mobility. That is, if capital is mobile, it will flow to the country with the greatest return on investment. As such, investment in one country is money that cannot be invested in another country, making each country's level of investment dependent upon the investment in other countries. Given this relationship, we empirically model Equation (1) as a spatial autoregressive (lag) process:

$$\frac{I}{Y_{it}} = \alpha + \beta \frac{S}{Y_{it}} + \varrho W \frac{I}{Y_{it}} + \varepsilon_i. \quad (2)$$

In estimating Equation (2), we use data from the Penn World Table version 7.2, which span 1950 through 2009. Within these data, there are 26 countries. All countries span the complete time period with the exceptions of Germany (1970-2009), Greece (1951-2009), and Korea (1953-2009). As is standard in the literature, both saving and investment rates are expressed relative to gross domestic product (GDP), with saving rates calculated as the residual of GDP less household and government consumption.

Empirically, Equation (2) is an ordinary least squares (OLS) specification of the SI relationship, with an additional term, $\varrho W(I/Y)_{it}$, which captures the impact of investment in one country on the level of investment in another country. Specifically, W is a block diagonal spatial weighting matrix, with each block, W_t, being of dimension n x n, where n is the number of observations in each year.[4] The on diagonal elements of W_t are set to zero to prevent a country's investment from being regressed on itself, while the off diagonal elements are equal to the absolute value of $(S/Y)_{it} - (S/Y)_{jt}$.[5] As is typical in the spatial econometrics literature, the specification of the weighting matrix is chosen based on one's belief about the relationship between spatially related observations.[6] In our case, this means that we rely on the SI literature and deviate from more common specifications of a spatial weighting matrix based on geographic proximity.[7]

Specifically, we define space as differences in saving rates. This is done because, if capital is mobile, one would expect that it would flow from high saving counties with a relatively low marginal product of capital to lower saving countries with a high marginal product of capital. Under the assumption of perfect capital mobility we would expect saving plus/minus net capital outflows to equate across countries. Countries with high saving rates today would invest in countries with lower saving rates (and higher returns to investment). Further, under the assumption

[4] Note that the aforementioned data represent an unbalanced panel. While this can potentially cause empirical problems as the weighted average is missing information in some years, our results are nearly identical to those obtained from running the same estimation procedure on a balanced panel without the countries for which we have missing years.

[5] To control for potential bias using the right hand side variable as the potential weighting instrument, we also use the difference in the lagged saving rates. The results are quantitatively similar and available upon request.

[6] See Anselin (1988) for an overview of spatial econometrics and modeling.

[7] For example, Baltagi *et al*. (2007); Blonigen *et al.* (2007); Bobonis and Shatz (2007); Coughlin and Segev (2000); and Garretsen and Peeters (2009) all use neighboring countries to capture spatial effects when examining various patterns in foreign direct investment.

of perfect capital markets and low transaction costs, there is no reason to expect the foreign investment decision to depend on proximity, but solely on rates of return.

The spatial weighting matrix, W, is row standardized so that $W(I/Y)_{it}$ can be interpreted as the weighted average investment of other OECD countries, with ϱ being the estimated term in Equation (2), relating the effect of the weighted average investment rate on domestic investment. Given this empirical model, if capital is mobile, one would expect both the estimated coefficient on the domestic saving rate, $(S/Y)_{it}$, to be small, and the estimated spatial coefficient, ϱ, to be positive, as increases in investment in other countries should increase the relative marginal return in the domestic country, thus increasing domestic investment.

The presence of the $W(I/Y)_{it}$ in Equation (2) above makes OLS estimation of Equation (2) biased as this term is endogenous. Therefore, we use maximum likelihood methods to estimate Equation (2) to account for this endogenous term. In later extensions we include controls for trade openness and country size, along with time and country fixed effects, to assess the SI relationship.

IV. Results

A. Summary Statistics

A complete set of summary statistics is provided in Table 2. We also present the statistics for trade openness, measured as the sum of exports and imports relative to GDP, and country size, measured as GDP for country i divided by the sum of all GDP for all countries by year. Table 5 presents the descriptive statistics for saving and investment, trade openness, and country size by decade.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Saving Rates	1536	0.2312	0.0772	-0.0136	0.5640
Investment Rates	1536	0.2287	0.0568	0.0625	0.45183
Trade Openness	1536	60.516	40.679	2.6359	324.3633
Country Size	1536	0.0391	0.0744	0.0002	0.4689

Table 3 presents the results for two panel unit root tests. Both tests offer a slightly different alternative hypothesis. We estimate the unit root tests following *Im et al*. (2003) and Choi (2001) (henceforth IPS and Choi, respectively). The IPS test allows the coefficient on the autoregressive parameter to be heterogeneous across panels. The IPS test has an alternative hypothesis that allows unit roots for some but not all of the individual panels. In essence the IPS test is based on the augmented Dickey-Fuller statistics averaged across all panels. We report the mean of the augmented Dickey-Fuller test statistic (t_{bar}) and the standardized t_{bar} statistic, Z_{t-bar}. Both statistics are consistent across variables. The IPS test confirms $s_{i,t}$ and $i_{i,t}$ follow a stationary process.

Finally, we estimate the panel unit root test following Choi (2001). Choi uses a GLS detrending method which follows from Elliott *et al.* (1996) and an error correction model to specify cross-sectional correlations. Choi reports three test statistics P_m, Z, and L^* which follow a standard

normal distribution under the null hypothesis.[8] Under the Choi test we reject the null of non-stationarity at the 1% level of significance for both variables.

Table 3: Unit Root Tests in Panel Data

Variable	$i_{i,t}$	$s_{i,t}$
IPS (2003) - t_{bar}	-2.669***	-2.344***
IPS (2003) - Z_{t_bar}	-6.481***	-4.665***
Choi (2001) – Pm	7.639***	4.864***
Choi (2001) – Z	-6.329***	-4.348***
Choi (2001) - L*	-6.476***	-4.389***

* p<0.10, ** p<0.05, *** p<0.01
IPS: under alternative hypothesis some panels are stationary.
Choi: under alternative hypothesis at least one panel is stationary.

B. Baseline Results

The results of estimating the spatial lag model given by Equation (2) are presented in three sections. The first section examines the estimated coefficients from a baseline model with only saving rates and the spatially weighted investment of other countries included in Equation (2). The second section then includes additional time variables to capture the change in the relationship over time, and finally, the third section includes explanatory variables capturing both trade openness and country size.

Table 4 presents the results from estimating Equation (1) via OLS in columns (1), (3) and (5) and Equation (2) via maximum likelihood, including the spatial lag term, in columns (2), (4) and (6). Note that the statistical significance of the spatial lag term, ϱ, in all three of the maximum likelihood regressions indicates that OLS suffers from omitted variables bias by not accounting for the weighted average investment rate of other countries. This bias is particularly problematic in estimating these SI regressions as the estimated coefficient in the OLS specifications is much larger in magnitude than those with the spatial lag term present, which would tend to point towards less mobile capital, the crux of the FH puzzle. In the baseline OLS regression (Model 1) the saving retention coefficient is 0.501, but after the inclusion of the spatial term, this coefficient is nearly cut in half to 0.264.

To this model, country fixed effects are included to control for the potential downward bias that results from the inclusion of Luxembourg, Switzerland, and other countries that offer unique circumstances. In addition, year fixed effects are added to control for the global business cycle.[9] The results incorporating these fixed effects are shown in models (3) and (4) with country fixed effects and the results with both country and year fixed effects are presented columns (5) and (6).

[8] For details of all three unit root tests we suggest reading Maddala and Kim (2003).
[9] In order to minimize short-term fluctuations and business cycle shocks, FH used time averaged data, which has subsequently been shown to bias the results upward as time averaged saving and investment rates are more a reflection of a stationary current account than capital mobility. The inclusion of year fixed effects will control for random shocks across countries and allow for the use of annual data.

As was shown previously, the specifications including the spatial lag term [models (4) and (6)] exhibit saving-retention coefficients that are statistically smaller than the OLS counterparts.[10]

Table 4: Baseline Saving Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
Saving	0.501***	0.264***	0.522***	0.414***	0.526***	0.375***
	(0.022)	(0.018)	(0.104)	(0.023)	(0.110)	(0.251)
Const.	0.113***	0.018***	0.108***	0.038***	0.027***	0.013***
	(0.005)	(0.004)	(0.024)	(0.006)	(0.040)	(0.004)
ϱ		0.654***		0.404***		0.429***
		(0.023)		(0.034)		(0.032)
R^2	0.464		0.425		0.507	
N	1536	1536	1536	1536	1536	1536
i FE	No	No	Yes	Yes	Yes	Yes
t FE	No	No	No	No	Yes	Yes

White standard errors in parentheses
*,**,*** Denote significance at the 10, 5, and 1 percent levels, respectively.

While our estimated saving-retention coefficients are significantly lower when accounting for the spatial dependence of investment, we note that they are still statistically different from zero. Given the previous literature, this result is not surprising, as the literature has well documented that investors have a preference for domestic assets, even after accounting for an appropriate risk premium. Another explanation for a non-zero saving-retention coefficient stems from the diversity of the OECD countries and time periods under consideration. Periods prior to the capital liberalization post-Bretton Woods are likely to push the saving-retention coefficient upward. However, in the next section, we show that for certain country groupings, the saving-retention coefficient is statistically insignificant.

Turning our attention to the estimated coefficients on the spatial lag term, ϱ, our estimates are positive and significant, providing further evidence of capital mobility. Were capital immobile, we would expect a statistically insignificant estimate for our spatial lag term as investment in one country would not impact investment in another country. However, the statistically significant positive estimate on this variable indicates that investment is positively correlated across borders, indicating that capital is mobile. That is, increases in investment in other countries will lower the marginal return in those countries and increase investment in the domestic country where the relative marginal return on investment is higher. Of particular importance to this relationship is the weighting of investment rates based on the differences in saving rates, as opposed to geographic distance. High saving countries will use their savings to purchase domestic capital causing the marginal returns to capital to decrease, eventually reaching a level where domestic savings will begin to flow to foreign economies, which have the relatively higher marginal product. As such, countries with a higher marginal return to capital are likely to be low saving, high growth

[10] Note that these results are higher than those found by estimating the spatial lag model without country and year fixed effects.

economies. Thus, our results in Table 4 show the mobility of capital, the smaller estimated coefficients on the domestic saving rate, and the positive statistically significant estimates on the spatial lag term.

In terms of the FH puzzle, these results are consistent with using SI regressions to shed light on the pattern of capital mobility. FH originally found a saving-retention coefficient which was statistically insignificant from one, while our results presented here show evidence of greater capital mobility. Extending these results to account for many of the aforementioned alterations to the original FH specification in the literature, we next allow the saving-retention coefficient to vary across decades and differing levels of trade openness and country size.

C. Extensions

We extend the baseline model by allowing the saving-retention coefficient to vary over time, country size, and trade openness. These results are presented in tables 6-10 (tables 9 and 10 appear in the appendix). These extensions are useful as they allow us to incorporate results from the SI literature. Specifically, it has been well documented that countries that are more dependent on foreign trade (see Fouquau *et al.* (2008), Krol (1996), and Tesar (1991)), and countries that are smaller in terms of GDP (see Kumar (2011) and Baxter (1993)), are more dependent on foreign capital. Further, we expect the saving-retention coefficient to decline over time as the world economy becomes more interconnected. Table 5 provides the summary statistics for saving and investment rates by decade, level of trade openness, and country size. These statistics point towards investment rates increasing slightly over time, with average saving rates increasing significantly during the last decade. It is also worth noting that the difference between saving and investment rates (a country's current account) has also increased in the 1990s and 2000s, as countries have been able to sustain longer current account imbalances during this period. This leads us to expect increased capital mobility and a lower saving-retention coefficient compared to the past two decades.

Table 5: Mean Values of Saving and Investment Rates by Decade

	1950s		1960s		1970s		1980s		1990s		2000s	
	S/*Y*	*I*/*Y*	*S*/*Y*	*I*/*Y*	*S*/*Y*	*I*/*Y*	*S*/*Y*	*I*/*Y*	*S*/*Y*	*I*/*Y*	*S*/*Y*	*I*/*Y*
Total	0.194	0.201	0.224	0.234	0.231	0.243	0.225	0.225	0.247	0.229	0.263	0.238
Trade Openness												
Low	0.168	0.183	0.199	0.220	0.222	0.240	0.217	0.215	0.226	0.231	0.237	0.254
Mid	0.192	0.203	0.223	0.233	0.214	0.232	0.200	0.215	0.217	0.227	0.197	0.227
High	0.271	0.250	0.281	0.270	0.273	0.266	0.257	0.241	0.291	0.231	0.309	0.242
Country Size												
Low	0.217	0.228	0.238	0.251	0.243	0.262	0.240	0.239	0.258	0.227	0.306	0.247
Mid	0.185	0.192	0.219	0.233	0.228	0.240	0.226	0.226	0.259	0.236	0.251	0.227
High	0.176	0.179	0.214	0.217	0.224	0.229	0.212	0.211	0.228	0.226	0.237	0.239

Similarly, the summary statistics show that relatively closed economies have higher investment rates (i.e., net debtor countries), whereas more open countries have significantly higher

saving rates (i.e., net creditor countries). Finally, small economies also have higher saving rates on average, while large economies have higher investment rates. One striking observation based on these averages is the change in investment and saving rates across groupings. Over the last four decades investment rates have remained nearly constant across differing levels of trade openness and country size, while saving rates have varied dramatically. For example, in the 1990's saving rates ranged from 0.226 to 0.291 percent for relatively closed, and relatively open economies, respectively. However, despite the varying levels of saving rates, investment rates are identical at 0.231. This result further motivates our use of saving differentials when controlling for the endogeneity of investment rates between countries. It must be that high saving countries are investing in low saving countries.

Incorporating these observations into our results, Table 6 presents the results of allowing the saving-retention coefficient to vary across decades. Previous work by Debarsy and Ertur (2010) split the same sample into three time periods, 1960-1970, 1971-1985, and 1986-2000, and then estimated a separate spatial autoregressive model for each individual time period. By splitting the observations by decade, we hope to get a better idea of how capital mobility has changed over time using more narrowly defined time intervals. Additionally, instead of sample splitting and estimating separate regressions, we interact saving rates with decade specific dummy variables, and restrict the constant to be equal across decades. This is done to maintain the benefits of our large dataset.

Our results show that the models incorporating the spatial lag term have saving-retention coefficients which are significantly lower than their OLS counterparts. Further, the coefficient on the spatial lag term remains positive and significantly different than zero. The results also indicate that the saving-retention coefficient has declined over time, and is robust to the inclusion of country and time fixed effects.

Model (1) displays little evidence of changing capital mobility across periods, with the saving coefficient being the highest in the 1970s (0.585), and the lowest in the 2000s (0.466). The inclusion of our spatial lag term lowers these estimated coefficients in all periods, but does not provide much evidence of capital mobility changing over time. With the inclusion of both country and year fixed effects, the saving-retention coefficient declines, with the highest value being 0.564 for the 1950s, and the lowest value being 0.190 for the 2000s. These results support the hypothesis that capital mobility has increased over time.

Table 6: Saving Regressions with Varying Decade Coefficients

	(1)	(2)	(3)	(4)	(5)	(6)
S_{1950}	0.496***	0.206***	0.570***	0.432***	0.698***	0.564***
	(0.027)	(0.025)	(0.100)	(0.029)	(0.109)	(0.044)
S_{1960}	0.571***	0.283***	0.627***	0.492***	0.718***	0.543***
	(0.023)	(0.021)	(0.092)	(0.025)	(0.096)	(0.038)
S_{1970}	0.585***	0.306***	0.633***	0.505***	0.593***	0.454***
	(0.026)	(0.022)	(0.091)	(0.025)	(0.133)	(0.048)
S_{1980}	0.523***	0.234***	0.571***	0.439***	0.530***	0.423***
	(0.022)	(0.020)	(0.093)	(0.026)	(0.083)	(0.035)
S_{1990}	0.488***	0.243***	0.537***	0.425***	0.486***	0.411***
	(0.024)	(0.018)	(0.100)	(0.024)	(0.121)	(0.033)
S_{2000}	0.466***	0.262***	0.515***	0.422***	0.226***	0.190***
	(0.023)	(0.019)	(0.094)	(0.023)	(0.106)	(0.026)
Const.	0.108***	0.019***	0.096***	0.412***	0.152***	0.088***
	(0.005)	(0.004)	(0.022)	(0.004)	(0.023)	(0.009)
ϱ		0.657***		0.348***		0.299***
		(0.023)		(0.033)		(0.034)
R^2	0.499		0.494		0.601	
N	1536	1536	1536	1536	1536	1536
I FE	No	No	Yes	Yes	Yes	Yes
T FE	No	No	No	No	Yes	Yes

White standard errors in parentheses
*,**,*** Denote significance at the 10%, 5%, and 1% levels.

Table 7 presents the result allowing the saving-retention coefficient to vary conditionally on a country's level of trade openness. The levels of openness are selected in an *ad hoc* fashion, with the sample being divided into thirds.[11] The coefficient on variable S_{low} measures the degree of capital mobility for countries in the lowest third of trade openness, i.e., relatively closed economies. A more detailed process of splitting the data would be to estimate the model searching for the value of trade openness that maximizes some F-statistic, and/or using information criteria (i.e., a threshold estimation process following Herzog (2010) or Fouquau *et al*. (2008)). This process would likely strengthen our results by causing the coefficient on the saving rate for relatively more open countries to decrease, while increasing the estimate for countries that are relatively closed; however, tests incorporating threshold effects with a spatial autoregressive lag time have yet to be developed.

Consistent with the literature, our estimated saving-retention coefficient is the smallest for the more open economies. The coefficient on the spatial lag term is also positive and statistically significant from zero. These results do show evidence of increased capital mobility for economies with a larger tradeable sector, but the variability in the saving-retention coefficient across levels

[11] We use the same selection process for country size.

of openness is minimal. In all cases, the saving-retention coefficients on S_{low} and S_{mid} are not statistically different. From Table 5, the more open countries are typically high saving countries with a current account surplus. While the average saving rates increased drastically for more open countries relative to the more closed economies, investment rates tend to be more similar. Finally, during the 1980s, 1990s, and 2000s, saving rates increased drastically for the more open economies, while there was very little difference between saving and investment rates for the other two subsets.

Table 7: Saving Regressions with Varying Trade Openness Coefficients

	(1)	(2)	(3)	(4)	(5)	(6)
S_{low}	0.628***	0.353***	0.623***	0.505***	0.586***	0.442***
	(0.022)	(0.020)	(0.092)	(0.026)	(0.103)	(0.026)
S_{mid}	0.636***	0.358***	0.615***	0.500***	0.592***	0.434***
	(0.023)	(0.020)	(0.092)	(0.024)	(0.104)	(0.026)
S_{high}	0.520***	0.286***	0.498***	0.407***	0.486***	0.344***
	(0.020)	(0.017)	(0.092)	(0.022)	(0.102)	(0.024)
Const.	0.093***	0.010***	0.097***	0.030***	0.079***	0.017***
	(0.005)	(0.004)	(0.021)	(0.006)	(0.022)	(0.009)
ϱ		0.624***		0.362***		0.409***
		(0.023)		(0.035)		(0.032)
R^2	0.509		0.508		0.531	
N	1536	1536	1536	1536	1536	1536
I FE	No	No	Yes	Yes	Yes	Yes
T FE	No	No	No	No	Yes	Yes

White standard errors in parentheses
*,**,*** Denote significance at the 10%, 5%, and 1% levels.

Table 8 presents the results of allowing for the saving-retention coefficient to vary by country size. Again, the results are consistent with the past literature in that the coefficient on the saving rate variable for relatively small countries is significantly lower than the coefficient for medium and large countries, with the saving-retention coefficient being smallest in the models that include the spatial lag term. Unlike the results controlling for trade openness, the saving-retention coefficients show a statistically significant decline from the large to medium to small economies. The saving-coefficient is lowest in Model (6) with a value of 0.247, but is similar across models. From Table 5, the investment rates are similar across differing degrees of country size, whereas small countries typically have high saving rates and large countries have lower saving rates. This suggests that small open countries use excess savings to fund investments in large closed economies. These results show an increase in capital mobility for all countries, including large economies. This helps to reconcile the baseline Feldstein-Horioka model with other measures of capital mobility.

Table 8: Saving Regressions with Varying Country Size Coefficients

	(1)	(2)	(3)	(4)	(5)	(6)
S_{low}	0.495***	0.258***	0.329***	0.270***	0.345***	0.247***
	(0.022)	(0.017)	(0.110)	(0.027)	(0.101)	(0.027)
S_{mid}	0.526***	0.282***	0.599***	0.471***	0.588***	0.424***
	(0.021)	(0.017)	(0.048)	(0.025)	(0.057)	(0.026)
S_{high}	0.529***	0.300***	0.632***	0.530***	0.629***	0.487***
	(0.022)	(0.017)	(0.045)	(0.022)	(0.052)	(0.024)
Const.	0.109***	0.014	0.110***	0.026***	0.083***	0.009
	(0.005)	(0.004)	(0.013)	(0.007)	(0.015)	(0.009)
ϱ		0.657***		0.358***		0.388***
		(0.023)		(0.034)		(0.031)
R^2	0.468		0.484		0.556	
N	1536	1536	1536	1536	1536	1536
I FE	No	No	Yes	Yes	Yes	Yes
T FE	No	No	No	No	Yes	Yes

White standard errors in parentheses
*,**,*** Denote significance at the 10%, 5%, and 1% levels.

Finally, it is useful to understand how capital mobility has changed over time while controlling for varying degrees of country size and trade openness. Tables 9 and 10, available in the appendix, present the results of allowing the saving-retention coefficient to vary across decades while also controlling for differing degrees of openness and country size. Table 9 presents the results of allowing for varying degrees of trade openness. Analyzing these results, we see capital mobility was highest in the 1950s, and diminished in the 1960s and 1970s. The 1980s show some evidence of increased mobility, but the 1990s, plagued with financial crises, have decreased levels of capital mobility. For the most open countries, the saving-retention coefficient is actually statistically insignificant from zero. The estimated saving-retention coefficient for the most open economies is 0.085 in the 1950s, and 0.068 in the 2000s. During the 1960s and 1970s this same saving-retention coefficient is greater than 0.500 for all levels of openness. The original FH results used averaged data from 1960-1974, and given our results, it should not be surprising that FH found a high level of capital immobility.

The same pattern of capital mobility is displayed in Table 10, with perfect capital mobility being present for the smallest countries during the 1950s, 1980s, and 2000s. In the 2000s large countries also display evidence of capital mobility. The 1960s have the lowest level of capital mobility, while the 1990s show evidence of decreased capital mobility, which could be the result of the frequency of financial crises in Asia, South America, and Europe.

V. Conclusion

This paper provides two significant contributions to the literature. Within the SI literature we show that the saving-retention coefficient is biased upward due to the failure to adequately control for the endogeneity of investment rates across countries. Using a spatial autoregressive (lag) process, the saving-retention coefficient is cut in half when compared to the simple OLS model.

Further, controlling for time, country size, and trade openness, we find evidence of perfect capital mobility during the 1950s, 1980s, and 2000s. Throughout the estimation process, small open economies displayed significantly more evidence of capital mobility than large, relatively closed economies.

The second contribution made is within the spatial literature linking countries through differences in saving rates. Past literature has focused mainly on spatial linkages based on geographic proximity, where investment in country i would be correlated with investment in the nearest economies. There are two main issues when using geographic proximity to construct the weighting matrix. First, if capital markets are efficient and have low transaction costs, we would expect capital to flow into those countries offering the greatest returns, all else equal. Using geographic distance primarily serves as a proxy for transportation costs, but technological advances have significantly reduced such transportation costs, leading us to believe proximity should not be a determining factor in capital mobility. Second, we expect the relationship between investments across countries to vary over time. Using proximity fails to control for the changing relationships between countries. Using differentials in country saving rates more accurately captures the relationship between investment rates across countries. Domestic investors have a preference for domestic assets, but given a positive shock in another country, domestic investors will shift excess savings to these countries. As such, only countries with excess savings will be able to take advantage of the higher returns.

Further extensions would allow the development of a richer model that measures capital mobility controlling for spatial differences in saving rates. Capital mobility has increased following the capital account liberalization that began at the conclusion of the Bretton Woods period. With these results, we are left asking if the Feldstein-Horioka result is still a puzzle; accounting for the endogeneity of investment provides ample evidence in support of perfect capital mobility. Over the last ten years, nearly all OECD countries display evidence of perfect capital mobility.

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Appendix

Table 9: Saving Coefficients by Decade for Varying Degrees of Openness

	(1)	(2)	(3)	(4)	(5)	(6)
			1950			
S_{low}	0.617	0.602	0.377	0.361	0.266	0.256
S_{mid}	0.645	0.628	0.347	0.334	0.235	0.228
S_{high}	0.581	0.558	0.235	0.224	0.091	0.085
			1960			
S_{low}	0.703	0.647	0.902	0.900	0.889	0.888
S_{mid}	0.688	0.637	0.832	0.831	0.827	0.827
S_{high}	0.645	0.584	0.700	0.700	0.695	0.696
			1970			
S_{low}	0.681	0.530	0.658	0.653	0.674	0.664
S_{mid}	0.659	0.561	0.630	0.626	0.627	0.619
S_{high}	0.606	0.480	0.534	0.533	0.508	0.505
			1980			
S_{low}	0.623	0.550	0.323	0.330	0.275	0.287
S_{mid}	0.660	0.593	0.316	0.316	0.254	0.261
S_{high}	0.611	0.545	0.286	0.282	0.243	0.245
			1990			
S_{low}	0.697	0.600	0.703	0.706	0.657	0.654
S_{mid}	0.704	0.618	0.626	0.624	0.577	0.577
S_{high}	0.524	0.443	0.522	0.521	0.460	0.459
			2000			
S_{low}	0.405	0.288	0.557	0.558	0.280	0.282
S_{mid}	0.347	0.207	0.442	0.442	0.131	0.134
S_{high}	0.257	0.153	0.396	0.398	0.063	0.068

Savings-retention coefficient is reported, complete results are available upon request

Table 10: Saving Coefficients by Decade for Varying Degrees of Country Size

	(1)	(2)	(3)	(4)	(5)	(6)
			1950			
S_{low}	0.586	0.567	0.157	0.135	0.067	0.052
S_{mid}	0.543	0.549	0.360	0.343	0.268	0.259
S_{high}	0.508	0.554	0.564	0.554	0.432	0.429
			1960			
S_{low}	0.645	0.577	0.766	0.763	0.763	0.762
S_{mid}	0.661	0.630	0.842	0.841	0.832	0.833
S_{high}	0.606	0.592	0.867	0.865	0.871	0.871
			1970			
S_{low}	0.617	0.480	0.422	0.415	0.399	0.385
S_{mid}	0.620	0.514	0.731	0.727	0.713	0.704
S_{high}	0.586	0.457	0.752	0.744	0.733	0.720
			1980			
S_{low}	0.594	0.521	0.143	0.132	0.075	0.075
S_{mid}	0.616	0.554	0.366	0.348	0.313	0.307
S_{high}	0.581	0.508	0.513	0.621	0.392	0.463
			1990			
S_{low}	0.463	0.357	0.378	0.378	0.416	0.408
S_{mid}	0.554	0.461	0.540	0.540	0.545	0.555
S_{high}	0.586	0.481	0.560	0.559	0.576	0.586
			2000			
S_{low}	0.214	0.124	0.330	0.332	0.101	0.106
S_{mid}	0.221	0.157	0.454	0.457	0.154	0.163
S_{high}	0.315	0.227	0.584	0.582	0.039	0.036

Savings-retention coefficient is reported, complete results are available upon request

The Journal of Business Inquiry 2015 14, Issue 1, 41-58
http:www.uvu.edu/woodbury/jbi/articles
ISSN 2155-4072

The Effect of Online External Reference Price on Perceived Price, Store Image, and Risk

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Previous research has shown that external reference prices provided by price comparison sites are known to increase both sellers' price competition and buyers' price sensitivity. However, there is no clear answer regarding the different impacts of various competition patterns, which are caused by the advent of competitors within price comparison sites, with respect to consumers' perceptions of price, store image, and risk. Our objective in this research is to investigate the effect of the external reference price within price comparison sites, which is determined by competitors' offering price, on perceived price, store image, and risk. In this research, we investigated whether perceived price, store image, and risk differ according to 1) store name (a known vs. unknown store); 2) brand name (a known vs. unknown brand); and 3) product category (look-and-feel vs. non-look-and-feel). Our results demonstrate that the effect of online external reference prices is significant on store image for an unknown store, regardless of product category. In addition, the effect of online external reference prices is significant on the price and risk perceptions for look-and-feel products, but not for non-look-and-feel products when the focal mall is an unknown store. However, the interaction effect on price perception disappears when the focal mall is a known store.

Keywords: Online Shopping; External Reference Price; Price Perception; Store Image Perception; Risk Perception; Store Name

JEL Classification: M31

I. Introduction

One of the biggest differences between online and offline shopping environments is the degree to which consumers compare prices. In online shopping environments, price comparison sites are widespread (Häubl and Trifts, 2000; Iyer and Pazgal, 2003; Pan, Ratchford, and Shankar, 2004). The presence of price comparison sites lowers consumers' search costs (Brynjolfsson and Smith, 2000). While online shopping has become a general trend, online retailers have a much harder time than ever finding a homerun strategy to defend themselves from cutthroat competition involving information on competitors' prices from price comparison sites, which function as external reference prices. Pretend for a moment that you own and manage an online shopping mall. When a famous competitor sells the same product online, what would be its impact on your customers? To be more specific, is the impact the same whether your store

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is as famous as the competitor or not? What if the location of the competitor is lower (i.e., showing a higher price within the price comparison sites than your price) or higher (i.e., showing a lower price within the price comparison sites than yours)? What if there is more than one famous competitor entering the online market with the same product that you carry in your online store?

Our objective in this research is to investigate the effect of the external reference price within price comparison sites, which is determined by competitors' offering price, on perceived price, store image, and risk. Many previous studies have examined the impact of external reference prices provided by price comparison sites in online purchasing behavior and price sensitivity. External reference prices provided by price comparison sites are known to increase both sellers' price competition and buyers' price sensitivity (Bakos, 1997; Degeratu, Rangaswamy, and Wu, 2000; Iyer and Pazgal, 2003; Shankar, Rangaswamy, and Pusateri, 1999). However, there is no clear answer regarding the different impacts of various competition patterns, which are caused by the advent of the competitors within price comparison sites, with respect to consumers' perceptions of price, store image, and risk. More specifically, we first investigate whether perceived price, store image, and risk differ according to 1) store name (a known vs. unknown store); 2) brand name (a known vs. unknown brand); and 3) product category (look-and-feel vs. non-look-and-feel). Then, under the significant conditions of the above-mentioned considerations (store brand, product brand, and category), we examine whether perceived price, store image, and risk differ by external reference price.

II. Conceptual Background and Hypotheses Development

A. Cue Utilization Theory

Consumers use various cues to infer product quality (Olson, 1973). Cue utilization theory provides an attractive framework through which to assess consumer perceptions of stores, brands, and products. These cues can be classified into extrinsic and intrinsic cues. While intrinsic cues are directly related to the nature and performance of physical products (e.g., ingredients, taste, smell, texture, and technical specifications), extrinsic cues are not related to product performance (Olson, 1972). When consumers make quality evaluations, they rely on extrinsic cues such as price (Leavitt, 1954), packaging (McDaniel and Baker, 1977), store name (Wheatley, Chiu, and Goldman, 1981), brand name (Allison and Uhl, 1964), and color (Peterson, 1977). A review of the literature suggests that consumers tend to use both intrinsic and extrinsic cues when evaluating products (Simonson, 1989; Szybillo and Jacoby, 1974).

B. Perceived Price

When making a purchase decision, consumers evaluate the price of a product based on some standard, which is known as a reference price (Emery, 1970; Monroe, 1973). Previous studies have proposed that internal reference prices rely on memory from prior purchases (Kalwani and Yim, 1992; Winer, 1986). As the reference price accumulates based on the average market price, fair price, or normal price compared to the actual price, it can serve as a point of comparison to judge whether the given price is acceptable, fair, high, or low (Grewal *et al.*, 1998; Mayhew and Winer, 1992; Monroe, 1990). As the internal reference is represented as a region rather than a point estimate, there exists latitude of price acceptance (Kalyanaram and Little,

1994; Monroe and Venkatesan, 1969; Sherif, Taub, and Hovland, 1958). This latitude is referred to as the acceptable price range with the identification of upper and lower limits (Monroe and Venkatesan, 1969). Kalyanaram and Little (1994) found the relationship between an internal reference price and an acceptable price range: consumers with higher average reference prices have wider acceptable price ranges. According to cue utilization theory, which conceptualizes products as an array of extrinsic and intrinsic cues serving as quality indicators, store name and brand name have an effect on product quality as extrinsic cues (Dodds, Monroe, and Grewal, 1991; Rao and Monroe, 1989). Rao and Monroe (1989) found a statistically significant positive relationship between price and quality perceptions. Thus, price perceptions can be explained by store name and brand name. Since uncertainty magnifies the impact of memory on setting internal reference prices (Monroe, 1971), uncertainty involved with the store and brand can influence consumers' price perceptions. Thus, we hypothesize the following:

H1-1: Online buyers have different (a) internal reference prices; and (b) acceptable price ranges by store name.

H1-2: Online buyers have different (a) internal reference prices; and (b) acceptable price ranges by brand name.

As an online shopping mall is a virtual environment, products in the online environment can be categorized as either sensory or non-sensory, depending on the product attributes (Degeratu, Rangaswamy, and Wu, 2000). In addition, de Figueiredo (2000) proposed the degree of easiness in evaluating a product on the Web, from non-look-and-feel to look-and-feel goods. This study adopts de Figueiredo (2000)'s classification of product categories: non-look-and-feel vs. look-and-feel. Non-look-and-feel goods that have fewer sensory attributes (e.g., commodity and quasi-commodity products such as computers) have characteristics similar to information-oriented products that consumers often pursue in order to meet utilitarian goals. On the contrary, look-and-feel goods (e.g., clothing) are similar to emotion-oriented products with hedonic goals. As price is one of the representative non-look-and-feel product attributes, compared to look-and-feel products, consumers' decisions on non-look-and-feel type products involve their cognition more than their affection or emotion. Based on this relationship, consumers' sensitivity on price perceptions may vary by product category. Therefore, we hypothesize the following:

H1-3: Online buyers have different (a) internal reference prices; and (b) acceptable price ranges by product category.

C. Perceived Store Image

As competition in the market is more and more accelerated, store image becomes an important component in the consumer's decision-making process (Nevin and Houston, 1980), and many stores try to alter their image in order to remain competitive (Grewal *et al.*, 1998). In traditional offline settings, store image includes the physical environment of the store, service quality, and merchandise quality (Boulding *et al.*, 1993; Zeithaml, Berry, and Parasuraman, 1996). In online environments, the competition is more severe, the entry barrier to the market is much lower, and consumers have easy access to information on stores so that the role of perceived store image may be more important. As in offline stores, the more positive the store name, the more positive the consumer's perceived store image is (Grewal *et al.*, 1998; Keaveney and Hunt, 1992). Likewise, there exists the positive effect of brand name on product quality perceptions (Richardson, Dick, and Jain, 1994), which is part of the store image. According to cue utilization theory, brand name and store name are frequently used by consumers as a

composite of information (Olson, 1976). Zimmer and Golden (1988) found that consumers use store names to describe a prototypical store (e.g., "Like Sears"), which is a form of the category-based processing perspective of store image suggested by Keaveney and Hunt (1992). In addition, Jacoby and Mazursky (1984) found that retailers with an unfavorable image could improve that image by carrying brands with a more favorable image. Thus, we hypothesize the following:

H2-1. Online buyers form different store image perceptions by store name.
H2-2. Online buyers form different store image perceptions by brand name.

D. Perceived Risk

Perceived risk refers to consumers' perceptions of the uncertainty and concomitant adverse consequences of buying a product (Dowling and Staelin, 1994). Compared to the offline shopping environment, where consumers check and receive the product at the point of sale, the online shopping environment does not satisfy this condition, so that the overall perceived risk in the online shopping environment is greater. As consumers tend to perceive an online store with a good reputation as being more trustworthy and credible than one with a poor reputation, an online store's reputation can foster perceived risks such as financial, performance, and privacy risk (Chen and Dubinsky, 2003). In addition, as the product quality increases, uncertainty associated with the store, such as performance risk, decreases (Chen and Dubinsky, 2003; Sweeney, Soutar, and Johnson, 1999). Moreover, de Figueiredo (2000) explained that the degree of easiness in evaluating a product on the Web (from non-look-and-feel to look-and-feel goods) affects the consumer's information searching process. For look-and-feel type products, the purchasing process is more involved with sensory information than for non-look-and-feel type products. Since online shopping sites do not provide as much sensory information as offline shopping (such as touching, feeling, trying on, or seeing actual products in person), the perceived risk from look-and-feel type products is higher than that from non-look-and-feel type products. Thus, we hypothesize the following:

H3-1. Online buyers have different perceived risk by store name.
H3-2. Online buyers have different perceived risk by brand name.
H3-3. Online buyers have different perceived risk by product category.

E. External Reference Price

Kalyanaram and Winer (1995) divided reference prices into two types: internal and external. While internal reference prices rely on one's memory from prior purchases (Kalwani and Yim, 1992; Winer, 1986), external reference prices are provided in the purchase environment, such as the price tags of competing products on the shelf. According to Grewal, Marmorstein, and Sharma (1996), when consumers are in a store, a within-store comparison results in greater perceptions of value than a between-store comparison, whereas a between-store comparison is more effective than a within-store comparison when consumers are at home. Compared with traditional offline stores, the conditions of online stores with external reference prices are similar to those when consumers are at home so that between-store comparisons will be more effective.

If the focal mall is a well-known store, the advent of a famous competitor is not a significant threat, and it does not intensify the competition, since the store name enhances buyers'

perceptions on the perceived price, product evaluation, and store image so that the buyers do not perceive the differences (Dodds, 1991). On the other hand, when consumers shop at an unknown store, if a famous competitor's price is shown as an external reference price (ERP), there may be damage done to the image of the unknown store, as consumers can easily perceive the differences in the store name (Dodds, Monroe, and Grewal, 1991; Rao and Monroe, 1989). For price and risk perceptions, the effect would be minimal for non-look-and-feel products, since they are information-oriented products to meet consumers' utilitarian goals based on intrinsic cues. However, the effect of external reference prices may be significant on consumers' decisions about look-and-feel type products, as these products involve more extrinsic cues (de Figueiredo, 2000). Thus, we propose our hypotheses as the following:

H4-1: When online buyers shop at an unknown mall (a known mall), the effect of external reference prices (ERP) on price perceptions differs (does not differ) by product category.

H4-2: When online buyers shop at an unknown mall (a known mall), the effect of external reference prices (ERP) on store image differs (does not differ), regardless of product category.

H4-3: When online buyers shop at an unknown mall (a known mall), the effect of external reference prices (ERP) on risk perceptions differs (does not differ) by product category.

III. Experiments

A. Study 1: The Effects of Store Name, Brand Name, and Product Category

This study uses a 2 (store name: known vs. unknown) x 2 (brand name: known vs. unknown) x 2 (product category: look-and-feel vs. non-look-and-feel) factorial design to test the proposed hypotheses. Store name and brand name are between-subject factors and product category is manipulated as a within-subject factor. We hired a professional market research agency in Korea to conduct this experiment by using its online panel members. This study used experimental materials developed to reflect a hypothetical online shopping situation posted on the website of the research agency. A total 160 subjects participated in this study. We screened out subjects who did not have online purchasing experience within the past three months, and we had an equal quota for gender. Table 1 summarizes the key demographics and online shopping experiences of the subjects: they are relatively young (51.2% are in their 20s) and have fairly good online shopping experience.

Table 1: Subject Profiles on Key Demographics and Internet Buying Experiences (Study 1)

Demographics		Percentage	Internet buying experiences		Percentage
Gender	Male	40.0%	Internet shopping period	Less than 1yr	1.9%
	Female	60.0%		1~2 yrs	5.6%
Age	Less than 20	16.3%		2~3 yrs	13.1%
	21~25	30.6%		3~4 yrs	19.4%
	26~30	20.6%		4+ yrs	60.0%
	31~35	16.3%	Internet shopping frequencies during past 3 months	1~3	29.4%
	More than 35	16.2%		4~6	31.3%
Income	Less than 1m	39.3%		7~9	16.8%
	1m~1.99m	26.3%		10+	22.5%
	2m~2.99m	16.8%	Purchase experience of digital products	Yes	70.0%
	3m~3.99m	10.6%		No	30.0%
	More than 4m	6.9%	Purchase experience of clothing products	Yes	89.4%
				No	10.6%

To manipulate the known and unknown shopping malls, we used the well-known CJ mall for the known shopping mall and made up a fictitious shopping mall for the unknown shopping mall. For the two product categories, notebook computers and jeans were used for the non-look-and-feel and the look-and-feel categories, respectively. We selected these two categories after evaluating the easiness of quality judgments in the online shopping context among the most frequently purchased product categories reported by Ernst & Young (2001). For each product category, two brands were chosen: Samsung Sense and a fictitious brand for notebook computers, and Levi's and a fictitious brand for jeans.

When subjects click on the experiment link to participate, they are randomly assigned to four sites (2 store names x 2 brand names). Then, the subjects are asked to assume a situation in which they need a product for their personal use, and they decide to purchase it online. For this study, we prepare web pages almost like a real shipping environment. In the shopping mall, we provide the product and price information of the target items, where the price of the target item is set at the middle of the five price levels provided. All subjects then move to the questionnaire pages for the measurement of price, store image, and risk perceptions. At this stage, they are not allowed to go back to the product information. Except for the store and brand name, all other aspects, including web design and price, are identical. Each subject completes the tasks for both product categories, and the order of the product category is counterbalanced.

Two price perceptions are measured. Internal Reference Price (IRP) is measured by the mean value of three price estimations on the average market price and fair price, as used by Grewal *et al.* (1998). Acceptable Price Range (APR) is the gap between the maximum acceptable price and the minimum acceptable price (Lichtenstein, Bloch, and Black, 1988; Lii and Lee, 2005; Monroe, 1971) and is calculated from the subjects' responses on the maximum and minimum acceptable price estimations. Because of the difference in the price level between the product categories, we convert the price measure to a percentage deviation from the target price of each product category to make the comparison between the product categories comparable (Simonin and Ruth, 1995). The perception measures of store image and risk are measured using a seven-point Likert scale, based on the items used by Grewal *et al.* (1998) and Jarvenpaa and Tractinsky (1999). As reported in Table 2, Cronbach's alphas of all variables are well above the reliability standard value of 0.7.

Table 2: Scale Items of Dependent Measures

Items	Reliability	
	Notebook	Jeans
Internal reference price (Grewal *et al.*, 1998)	0.77	0.77
The normal price of the product would be _____.		
The average market price of the product would be _____.		
_____ would be the fair price of the product.		
Maximum acceptable price	-	-
I am willing to pay a maximum amount of _____ to buy this product.		
Minimum acceptable price	-	-
I think I have to pay a minimum amount of _____ to buy this product.		
Perceived store image (Grewal *et al.*, 1998)	0.89	0.91
Provide accurate product information		
Provide good overall service		
Provide helpful service		
Carry high-quality merchandise		
Perceived risk (Jarvenpaa *et al.*, 1999)	0.89	0.90
How would you characterize the decision of whether to buy a product from this web retailer? (significant opportunity / significant risk)		
How would you characterize the decision of whether to buy a product from this web retailer? (very positive situation / very negative situation)		
How would you characterize the decision of whether to buy a product from this web retailer? (very high potential for gain / very high potential for loss)		

B. Study 2: The Effects of Online External Reference Prices

This study uses a 2 (store name: unknown vs. known) x 2 (product category: look-and-feel vs. non-look-and-feel) x 4 (ERP: non vs. above vs. below vs. above & below) factorial design to test the proposed hypotheses. We manipulate store name and product category similarly to what we have done in Study 1. Using the same online panel as in Study 1, a total of 320 subjects participated in this study. The sample profiles are very similar to those from Study 1. Details about the sample profile are summarized in Table 3.

Table 3: Subject Profiles on Key Demographics and Internet Buying Experiences (Study 2)

Demographics		Percentage	Internet buying experiences		Percentage
Gender	Male	46.9%	Internet shopping period	Less than 1yr	1.8%
	Female	53.1%		1~2 yrs	6.3%
Age	Less than 20	10.3%		2~3 yrs	19.1%
	21~25	24.7%		3~4 yrs	17.5%
	26~30	18.4%		4+ yrs	55.3%
	31~35	16.6%	Internet shopping frequencies during past 3 months	1~3	30.3%
	More than 35	30.0%		4~6	30.0%
Income	Less than 1m	30.6%		7~9	13.4%
	1m~1.99m	24.7%		10+	26.3%
	2m~2.99m	23.1%	Purchase experience of digital products	Yes	69.1%
	3m~3.99m	10.9%		No	30.9%
	More than 4m	10.7%	Purchase experience of clothing products	Yes	85.6%
				No	14.4%

As in Study 1, the price of the focal mall is set at the middle of the five price levels provided. While all of the external prices are unknown in Study 1, some stores in Study 2 can be famous, based on the given conditions of none, above (lower price), below (higher price), and above & below (lower and higher price). As the effect of store name was significant in Study 1, we divide our analysis into the case when the focal mall is unknown and known.

IV. Results

A. Study 1: The Effects of Store Name, Brand Name, and Product Category

Table 4 shows a summary of the descriptive statistics on the dependent measures. To test the predicted effects as a multivariate level (perceived price, store image, and risk), a MANOVA test is conducted first using SPSS. As shown in Table 5, MANOVA results show significant main effects of product category and store name, providing supporting evidence for H1-1, H2-1, H3-1, H1-3, and H3-3 at the multivariate level. The effects are further investigated using univariate analysis for significant effects at the multivariate level. Table 6 summarizes the univariate ANOVA results for all four dependent variables. First, the results of the main effects show that the effect of product category is significant for the internal reference price and the acceptable price range ($F=16.30$, $p<.01$), thereby supporting H1-3 (a) and H1-3 (b), but failing to support H3-3. The univariate ANOVA results of store name show significant effects on the internal reference price ($F=7.99$, $p<.01$), store image ($F=19.69$, $p<.01$), and risk ($F=22.93$, $p<.01$), thereby supporting H1-1 (a), H2-1, and H3-1, but failing to support H 1-1 (b). However, the effects of brand name are insignificant on price, store image, and risk perceptions, thereby failing to support H1-2 (a), H1-2(b), H2-2, and H3-2.

Based on Study 1, we can conclude that 1) the internal reference price is different by store name (the internal reference is lower for customers using known stores); 2) the internal reference price is different by product category (the internal reference price is lower for the look-and-feel product); 3) the acceptable price range is different by product category (the acceptable price range is wider for the look-and-feel type product); 4) the perceived store image is different

by store name (store image is better for the known store); and 5) the perceived risk is different by store name (the perceived risk is smaller for the known store).

Table 4: Means and Standard Deviations of Perception Measures of Price, Store Image, and Risk

	Notebook					**Jeans**				
	Store		Brand		Total	Store		Brand		Total
	Unknown	Known	Unknown	Known		Unknown	Known	Unknown	Known	
Price perceptions										
Internal reference price (IRP)	-0.031	-0.063	-0.057	-0.036	-0.047	-0.060	-0.135	-0.120	-0.075	-0.098
	(0.098)	(0.098)	(0.103)	(0.094)	(0.099)	(0.167)	(0.192)	(0.165)	(0.198)	(0.183)
Acceptable price range (APR)	0.084	0.077	0.078	0.083	0.081	0.125	0.136	0.130	0.131	0.131
	(0.092)	(0.073)	(0.061)	(0.101)	(0.083)	(0.116)	(0.097)	(0.098)	(0.116)	(0.107)
Store image perception	3.894	4.678	4.450	4.122	4.286	3.881	4.519	4.238	4.163	4.200
	(0.949)	(1.193)	(1.167)	(1.103)	(1.144)	(1.010)	(1.281)	(1.272)	(1.116)	(1.193)
Risk perception	3.496	2.617	2.975	3.138	3.056	3.613	2.721	3.179	3.154	3.167
	(1.260)	(1.188)	(1.328)	(1.270)	(1.298)	(1.432)	(1.247)	(1.481)	(1.347)	(1.411)

* Price measure was converted to a percentage deviation from the actual price. It was calculated as: (price-estimate - actual price of the target product)/actual price of the target product.
* Scale measures represent average responses from a 7-point Likert scale.

Table 5: MANOVA Results

Source	Pillai's trace	Wilks' lambda	Hotelling's trace
Main effects			
Product category (Cat)	.273**	.727**	.376**
Store name (SN)	.209**	.791*	.265**
Brand name (BN)	.033	.967	.034
2-way interactions			
Cat x SN	.031	.969	.032
Cat x BN	.029	.971	.030
SN x BN	.008	.992	.008
3-way interactions			
Cat x SN x BN	.006	.994	.006

Note: *:p<.05, **:p<.01.

Table 6: Univariate ANOVA Results

Source	df	F value			
		Internal reference price	Acceptable price range	Store image perception	Risk perception
Main effects					
Product category (Cat)	1	16.301**	32.559**	1.370	1.630
Store name (SN)	1	7.989**	.024	19.690**	22.934**
Brand name (BN)	1	2.979	.052	1.583	.138
2-way interactions					
Cat x SN	1	2.917	.945	1.000	.005
Cat x BN	1	.885	.055	2.972	1.175
SN x BN	1	.296	.064	.687	.257
3-way interactions					
Cat x SN x BN	1	.100	.430	.330	.005

Note: *:p<.05, **:p<.01.

A. Study 2: The Effects of Online External Reference Prices

Tables 7 and 8 show the summary of the descriptive statistics on the dependent measures when the focal mall is known and unknown, respectively.

Table 7. Means and Standard Deviations of Perception Measures of Price, Store Image, and Risk in Known Focal Mall

	Notebook					**Jeans**				
ERP by famous competitor	No	Above	Below	Above & below	Total	No	Above	Below	Above & below	Total
Price perceptions										
Internal reference price (IRP)	-0.045	-0.033	-0.029	-0.051	-0.04	-0.127	-0.092	-0.155	-0.113	-0.121
	-0.094	-0.092	-0.07	-0.085	-0.086	-0.124	-0.144	-0.181	-0.159	-0.154
Acceptable price range (APR)	0.075	0.082	0.091	0.066	0.078	0.102	0.136	0.136	0.133	0.127
	-0.077	-0.067	-0.057	-0.046	-0.063	-0.093	-0.115	-0.098	-0.112	-0.105
Store image perception	4.781	4.638	4.613	4.294	4.581	4.506	4.4	4.531	4.381	4.455
	-1.011	-1.138	-0.65	-0.868	-0.943	-1.072	-1.174	-0.946	-0.845	-1.009
Risk perception	3.05	2.542	2.725	3.025	2.835	2.975	3.158	3.058	3.142	3.083
	-1.19	-1.265	-1.247	-1.092	-1.208	-1.266	-1.408	-1.325	-1.164	-1.284

* Price measure was converted to a percentage deviation from the actual price. It was of the target product.
* Scale measures represent average responses from a 7-point Likert scale.

Table 8: Means and Standard Deviations of Perception Measures of Price, Store Image, and Risk in Unknown Focal Mall

	Notebook					Jeans				
ERP by famous competitor	No	Above	Below	Above & below	Total	No	Above	Below	Above & below	Total
Price perceptions										
Internal reference price (IRP)	-0.039	-0.034	-0.037	-0.041	-0.038	-0.156	-0.089	-0.086	-0.073	-0.101
	(0.081)	(0.074)	(0.109)	(0.098)	(0.091)	(0.131)	(0.165)	(0.161)	(0.167)	(0.158)
Acceptable price range (APR)	0.090	0.070	0.076	0.066	0.076	0.135	0.133	0.160	0.108	0.134
	(0.079)	(0.046)	(0.059)	(0.060)	(0.062)	(0.078)	(0.111)	(0.107)	(0.106)	(0.102)
Store image perception	4.256	4.069	3.900	4.125	4.088	4.356	3.981	3.738	4.031	4.027
	(0.730)	(0.738)	(0.718)	(1.059)	(0.826)	(0.695)	(0.785)	(0.707)	(1.067)	(0.849)
Risk perception	3.525	3.517	3.675	3.658	3.594	4.308	4.083	3.717	3.425	3.883
	(1.137)	(1.222)	(0.986)	(1.218)	(1.136)	(1.128)	(1.219)	(1.093)	(1.219)	(1.204)

* Price measure was converted to a percentage deviation from the actual price. It was calculated as: (price-estimate - actual price of the target product)/actual price of the target product.

To test the predicted effects at a multivariate level (perceived price, store image, and risk), two MANOVA tests are conducted using SPSS for known and unknown focal malls, respectively. MANOVA results for both known and unknown focal malls, as shown in Tables 9 and 11, show significant main effects of product category and significant 2-way interaction effects of product category and ERP at the multivariate level. In addition, when the focal mall is unknown, the results show significant main effects of ERP. The effects are further investigated using univariate analysis for significant effects at the multivariate level. Tables 10 and 12 summarize the univariate ANOVA results for all four dependent variables. The results from the two univariate ANOVAs confirm H1-3 (a) and H1-3 (b), which is consistent with the results from Study 1. While H3-3 was not supported in Study 1, Study 2 demonstrates that online buyers have different perceived risk by product category, which finds that consumers perceive more risk when purchasing look-and-feel goods.

For the known focal mall, all main effects of ERP are insignificant, and the 2-way interaction effects of category and ERP are insignificant on price perceptions and store image, thereby supporting H4-1 and H4-2. On the other hand, when the focal mall is unknown, the main effect of ERP is significant for store image, supporting H4-2, and the 2-way interaction effects of category and ERP are significant on internal reference price and risk perception, thereby supporting H4-1 and H4-3.

Table 9: MANOVA Results for Known Focal Mall

Source	Pillai's trace	Wilks' lambda	Hotelling's trace
Main effects			
Product category (Cat)	.411**	.589**	.699**
External reference price	.051	.950	.052
2-way interactions			
Cat x ERP	.142*	.865*	.149*

Note: *:p<.05, **:p<.01.

Table 10: Univariate ANOVA Results for Known Focal Mall

Source	df	F value			
		Internal reference price	Acceptable price range	Store image perception	Risk perception
Main effects					
Product category (Cat)	1	57.336**	38.662**	3.805	7.93**
External reference price	1	.621	.955	.871	.371
2-way interactions					
Cat x ERP	1	2.003	1.138	1.627	2.847*

Note: *:p<.05, **:p<.01.

Table 11: MANOVA Results for Unknown Focal Mall

Source	Pillai's trace	Wilks' lambda	Hotelling's trace
Main effects			
Product category (Cat)	.440**	.560**	.787**
External reference price	.151*	.854*	.166*
2-way interactions			
Cat x ERP	.190*	.817*	.216*

Note: *:p<.05, **:p<.01.

Table 12: Univariate ANOVA Results Unknown Focal Mall

Source	df	F value			
		Internal reference price	Acceptable price range	Store image perception	Risk perception
Main effects					
Product category (Cat)	1	39.004**	71.042**	.947	6.642*
External reference price	1	1.154	1.442	3.057*	1.222
2-way interactions					
Cat x ERP	1	3.391*	1.984	.808	4.326*

Note: *:p<.05, **:p<.01.

As shown in Figure 1, when the focal mall is unknown, there exists a significant difference in perceived store image by ERP. This figure explains that the store image is highest when there is no famous ERP. With the advent of the famous ERP, the store image of the unknown focal malls underwent some damage, which is in line with H4-2. Figures 2 and 3 demonstrate the interaction effects of product category and ERP on the IRP (internal reference price) deviation and risk perceptions, respectively. When consumers purchase look-and-feel products, if there is no famous competitor as an ERP, they form the lowest IRP, and this IRP increases as the ERP of the famous competitor is provided. On the other hand, there is no difference in the IRP for non-look-and-feel products. Figure 3 shows that the perceived risk for look-and-feel products decreases with the advent of the ERP. These results support H4-1 and H4-3.

Figure 1: The Effect of ERP on Store Image in the Unknown Focal Mall

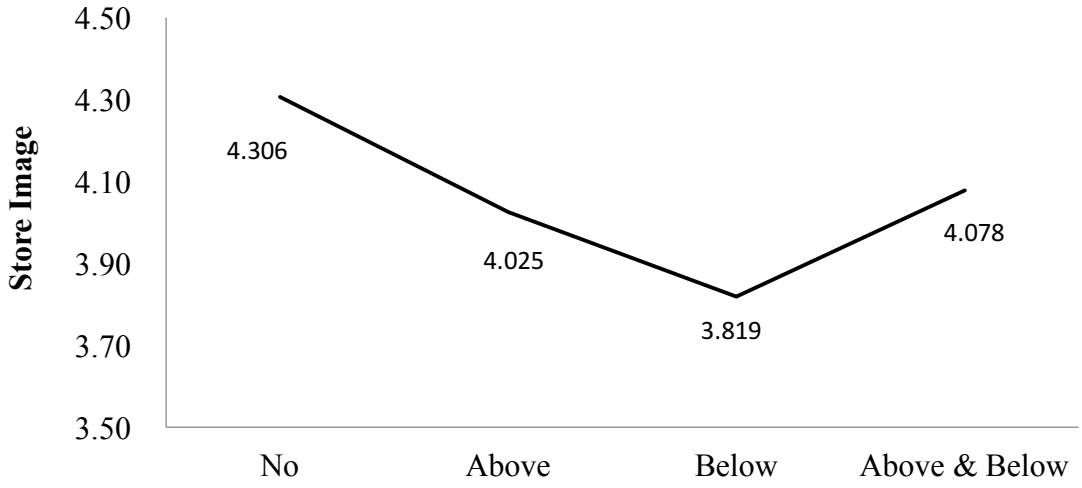


Figure 2: The Effect of ERP by Product Category on IRP Deviation in the Unknown Focal Mall

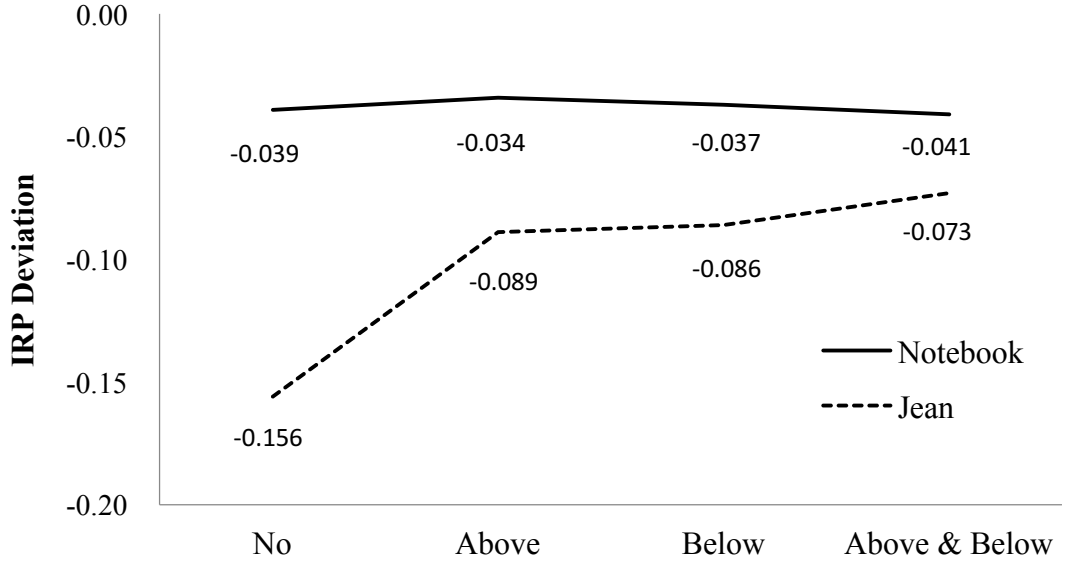
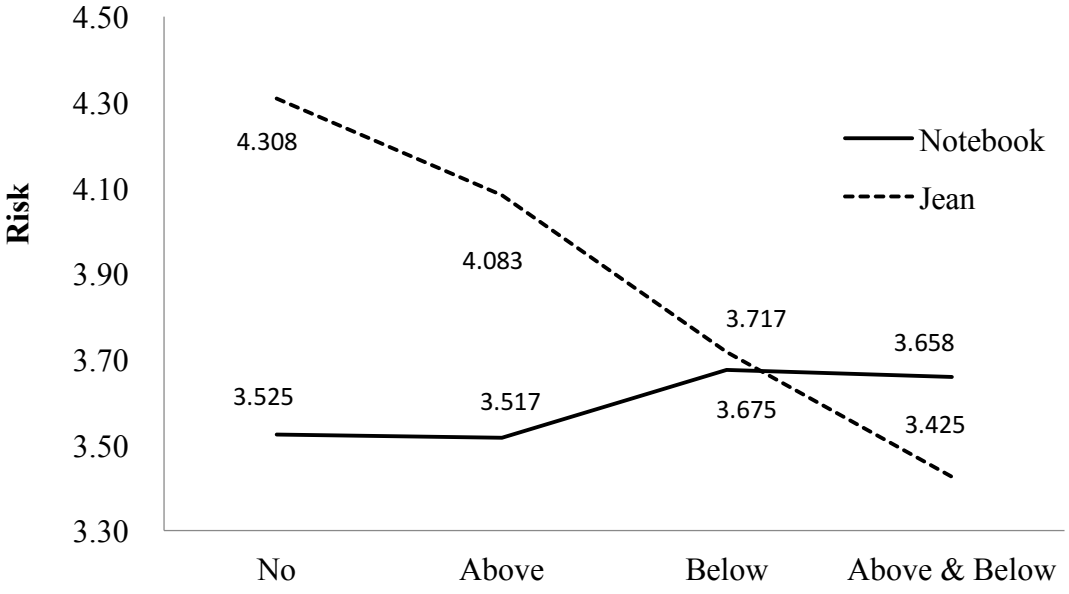


Figure 3: The Effect of ERP by Product Category on Risk in the Unknown Focal Mall



In sum, when consumers shop at an unknown store, the effect of ERP is different on store image, regardless of product category. In addition, the effect of ERP on perceived price and risk differs by product category (the effect of online external reference price is significant on the price and risk perceptions for look-and-feel products, but not for non-look-and-feel products). However, at a known store, the interaction effect on price perception disappears.

V. Discussion

Marketers for online shopping malls try to manage informational cues (price, store name, brand name, and product category) to derive better business performance through improved perceptions of price, store image, and risk. However, previous studies suggest external reference prices provided by price comparison sites are known to increase both sellers' price competition and buyers' price sensitivity by lowering search costs. However, they do not clearly provide answers to managers on how to deal with cutthroat competition (stores cannot keep decreasing the price).

This research seeks to address the limitations of previous research on price comparison sites by investigating the effect of external reference price within price comparison sites, which is determined by competitors' number and price, on the perceived price, store image, and risk. Based on cue utilization theory, we examined the effect of ERP on price, store image, and risk perceptions based on two studies and found moderating effects of product category and store name.

In addition to its theoretical contribution, the results of this research provide managerial implications for store managers, as they can predict what will happen in terms of consumers' perceptions on price, store image, and risk when the market situation changes. For example, when there is more competition in the market as competitors sell the same product online, it is a threat. However, managers cannot continuously lower the price to maintain a higher (more advantageous) location on the price comparison site. Based on our research, if the store is a well-known one, managers have no need to aggressively lower the price and reduce the margin, as the online external price does not impact on customers' price perceptions, store image, and risk. However, when the store is unknown, the confrontational strategy should be different, as the advent of other competitors diminishes the image of the unknown store. If the store sells look-and-feel products such as clothing, the manager may need to make efforts to improve not only the perceived price, but also the risk. However, if it is a non-look-and-feel product, such as an electronic device, the manager may need to focus on handling the perceived price.

Although this study provides meaningful theoretical and managerial insights into the effect of external reference prices, there are some limitations. First, this study examined the effect of external reference prices on price, store image, and risk perceptions in just two product categories. Future studies may examine various other product categories. Second, we used five stores and their prices as external references. However, online shopping malls provide more information, such as consumer reviews, merchant ratings, and shipping costs. This additional information may provide much richer theoretical and managerial implications in making strategic decisions for online stores. Third, this study only considers the online environment. However, these days, many companies sell products both online and offline to convince their customers to buy the products as customers look for information online and then purchase them offline after feeling, touching, and seeing the products by themselves. While this haptic sense (Klatzky and Lederman, 1992 and 1993; Lederman and Klatzky, 1987; Peck and Childers, 2003)

and hybrid nature of online and offline stores were not the focus of this study, given the wealth of research in the area, future research may develop a hybrid store environment (online with offline stores) based on the concept of haptic sense.

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