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HEC MONTRÉAL
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Two Essays on Customer Protection Initiatives

par
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Two Essays on Customer Protection Initiatives

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Résumé

Cette thèse explore différentes perspectives aux initiatives de protection des clients. Le premier essai intitulé "L'efficacité des étiquettes d'avertissement pour les consommateurs: Une méta-analyse des enquêtes dans leur processus sous-jacent et Imprévu" est une méta-analyse complète sur l'alerte produit étiquettes efficacité qui (1) développe et teste un cadre conceptuel décrivant le processus sous-jacent l'efficacité des étiquettes d'avertissement, (2) identifie et les tests de nouveaux modérateurs, et (3) traite des questions méthodologiques. Cette méta-analyse montre que l'efficacité de l'étiquette est subordonnée au type de résultat comportemental attendu. Les étiquettes destinées à la modulation / cessation affichent une cascade généralement diminution des effets de l'attention ($r = 0,32$), la compréhension ($r = 0,37$), le rappel ($r = 0,31$), jugement ($r = 0,22$), au comportement ($r = 0,18$). Les étiquettes visant l'utilisation sécuritaire montrent des tailles d'effet plus fortes pour le comportement ($r = 0,39$), malgré l'affichage d'une tendance à la baisse de l'attention ($r = .35$), la compréhension ($r = 0,29$), le rappel ($r = 0,32$), et le jugement ($r = 0,21$). Les auteurs constatent également preuve d'une efficacité accrue lors de pré-activation de l'étiquette au moyen d'une stratégie de communication intégrée ($r = 0,49$). En outre, les résultats montrent l'impact de plusieurs facteurs contextuels, par exemple, l'influence sociale ($r = 0,33$) et la fréquence d'exposition ($r = 0,12$). Le deuxième essai intitulé "Modération Effet du pays d'origine sur la relation des rappels de produits et de valeur de l'entreprise" explore le rôle des pays d'étiquettes d'origine (étroitement liée à la littérature des étiquettes d'avertissement) dans le contexte des rappels de produits. Les rappels de produits ont généralement un effet négatif sur la valeur d'une entreprise (Chen et al 2009; Davidson et Worrell 1992; Hoffer et al 1988; Jarrell et Peltzman 1985; Thomsen et McKenzie 2001; Zhao et al 2013). Les investisseurs, ainsi que les consommateurs, faire des inférences au sujet du pays d'origine lors d'un incident de rappel des produits. Pays d'origine signale la qualité de la production, contribue à l'équité de marque, et représente la capacité de l'entreprise à se remettre des conséquences de l'incident négatif à l'avenir. Nous constatons que ce pays d'origine peut diminuer de façon significative les rendements anormaux négatifs encourus par une entreprise dans un incident de rappel d'un produit complet de

signalisation de qualité supérieure. Nous ne trouvons pas de support pour un effet similaire des deux autres dimensions du pays d'origine. Une étude de l'événement, y compris 243 rappels de produits du marché américain, teste trois hypothèses. Un jeu de données unique est construit en utilisant les annonces de rappel de produits de la Consumer Product Safety Commission (CPSC).

Mots clés : La protection des consommateurs, les dangers du produit, des étiquettes d'avertissement, rappel de produit, pays d'origine.

Méthodes de recherche : Meta-analyse, Event study.

Abstract

This dissertation explores various perspectives on customer protection initiatives. The first essay entitled “The Effectiveness of Warning Labels for Consumers: A Meta-Analytic Investigation into Their Underlying Process and Contingencies” is a comprehensive meta-analysis on product warning labels effectiveness which (1) develops and tests a conceptual framework depicting the process underlying the effectiveness of warning labels, (2) identifies and tests new moderators, and (3) addresses methodological issues. This meta-analysis shows that label effectiveness is contingent on the type of expected behavioral outcome. Labels aimed at moderation/cessation display a generally diminishing cascade of effects from attention ($r = .32$), comprehension ($r = .37$), recall ($r = .31$), judgment ($r = .22$), to behavior ($r = .18$). Labels targeting safe-use show stronger effect sizes for behavior ($r = .39$) despite displaying a downward trend for attention ($r = .35$), comprehension ($r = .29$), recall ($r = .32$), and judgment ($r = .21$). Authors also find evidence of increased effectiveness when pre-activating the label by means of an integrated communication strategy ($r = .49$). In addition, results show the impact of several contextual factors, such as social influence ($r = .33$) and exposure frequency ($r = .12$). The second essay entitled “Moderating Effect of Country of Origin on the Relationship of Product Recalls and Firm Value” explores the role of country of origin labels (closely tied to warning labels literature) in the context of product recalls. Product recalls usually have a negative effect on a firm’s value (Chen et al. 2009; Davidson and Worrell 1992; Hoffer et al. 1988; Jarrell and Peltzman 1985; Thomsen and McKenzie 2001; Zhao et al. 2013). Investors, as well as consumers, make inferences about the country of origin during a product recall incident. Country of origin signals quality of production, contributes to brand equity, and depicts the ability of the firm to recover from the consequences of the negative incident in future. We find that that country of origin can significantly decrease the negative abnormal returns incurred by a firm in a product recall incident thorough signalling higher quality. We do not find support for a similar effect of the other two dimensions of country of origin. A unique dataset is built using product recall announcements from the Consumer Product Safety Commission (CPSC).

Keywords : Consumer protection, product hazard, warning labels, product recall, country of origin.

Research methods : Meta-analysis, Event study.

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List of acronyms

CPSC: Consumer Product Safety Commission

FDA: Food and Drug Administration

NHTSA: National Highway Traffic Safety Administration

CRSP: The Center for Research in Security Prices

WRDS: Wharton Research Data Services

CD (CDISTANCE): Cultural Distance

CB (COUNTRYB): Country Brand

HLM: Hierarchical Linear Modeling

To Language, that makes us humans

To Time, that defines the journey that is called Life

To Vibration, that creates the energy of our universe

To Eternity, the most over-spoken and yet

the most under-discovered construct of all time

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Introductory Chapter

“ *Competition is not only the basis of protection to the consumer, but is the incentive to progress.*
~ President Herbert Hoover

Consumer protection in North America roots in the late nineteenth and early twentieth century. Traditionally, the efforts have been to mobilize effective political forces to fundamental health and safety issues. By the late twentieth century, the consumer movement gave rise to political coalitions that championed legislations to protect health and safety. Federal protective legislations and expansive agency authority such as FDA, CPSC, and NHTSA were put in place in response to emergence of national markets and concentration of economic power that unleashed forces beyond the ability of the typical consumers (Silber 2006).

Advocates of free markets and market deregulation have long criticised such consumer protection legislations by raising questions about appropriateness of such practices and agencies. They often believe that consumer protection laws hinder global competitiveness rather than promoting it; and believe that the relationship between manufacturers and consumers should be decided by unmediated market mechanisms. However, regulations may be able to protect consumer interests while preserving industry competitiveness by focusing on the content of the technical standards that define the architecture of the markets, and sharing that information with consumers (Winn 2006). In fact, technology standards have been applied as a form of consumer protection law or as means of increasing the effectiveness of such regulations since the 1920s (Winn 2006).

As we pace into the information age, it looks like the social movement of consumer protection is shifting its focus from intrusive governmental interventions to higher consumer autonomy by providing the consumers with the information they need to make

the right informed decisions. Today, there is a growing popularity of mandatory information disclosure as a mechanism for overcoming market failures caused by information asymmetries. Using the power of technology to provide mass customization can finally overcome the asymmetry in practical knowledge between consumers and manufacturers (Rubin 2006).

Today, the government of the United States has three commissions to monitor and control consumer safety, disseminate information, and ensure mandatory disclosure throughout various industries:

CPSC: The Consumer Product Safety Commission (CPSC) is responsible for monitoring and reducing the risks associated with general consumer products. The commission establishes rules and guidelines for manufacturers and helps consumers identify safety risks through tracking injury statistics in products, requiring mandatory and voluntary product recalls, and briefing mandatory (e.g., use of flame-retardant fabric for children's sleepwear) and non-mandatory (e.g., guidelines concerning playground surfacing) safety rules. The CPSC also contributes to reducing information asymmetry between manufacturer and consumer by maintaining a publicly searchable database about the products that consumers consider purchasing. The database also allows consumers to submit reports to the CPSC on the harms or risks related to the use of any consumer product within the scope of the CPSC.

FDA: The Food and Drug Administration (FDA) regulates product categories such as food, tobacco products, dietary supplements, prescription and over-the-counter pharmaceutical drugs, medical devices and cosmetics; and is responsible for protecting and promoting public health. Similar to CPSC, FDA has the authority to issue a product recall, require warning labels on product packages (e.g., on cigarette packages under the Family Smoking Prevention and Tobacco Control Act) and on printed advertising, and approve products safety before manufacturers can include them in their line-up.

NHTSA: The National Highway Traffic Safety Administration (NHTSA) regulates automobiles, trucks, motorcycles, and oversees other on-road vehicles as well as tires and child car seats.

Academic research

Despite the recent shift in public policy and consumer protection, information disclosure alone is hardly the silver bullet to eliminate harmful consumption, and cannot overcome systemic market failures such as those caused by incomprehensible or improperly timed disclosures. Moreover, it is expected that with so many products on market shelves, information flood result in overwhelm rather than empower; and can put consumers prone to a new type of ambiguity where consumers are not able to harness information and convert it to practical knowledge (Rubin 2006).

We find three emerging themes in this area of research that will help shape the future more-autonomous markets and how to regulate them to maximize consumer safety and protection:

1. **More complex consumption environment:** Technology is transforming consumer markets and consumer experiences. On one hand, free markets are spreading thanks to e-commerce and other technological advances in manufacturing, marketing, and economy. On the other hand, government intervention is changing into a new form as the traditional regulations are becoming obsolete (Winn 2007).
2. **Empowered consumers:** consumers have access to much more information than before and possess more critical reasoning power which makes them able to take more control over their consumption preferences and enforce their needs and wants to manufacturers and markets.
3. **Less government interventions:** Governments are willing to have less intervention in regulating consumption, giving way to more autonomous consumer markets. However, the transformation of government intervention can be inversely affected by spread of a new generation of invasive and unethical regime of regulatory practices using the very same technological advancements, as consumer advocates alarm (Winn 2007).

Why are these themes going to be a trend in the future of commerce and manufacturing? What are the expected consequences of adopting such safety means and vehicles? What will more autonomy of consumers, more bargaining power against firms and the government, and higher transparency of their demands mean to all engaging parties (i.e., consumers, manufacturers, investors, and policy makers)?

Structure of the thesis

The present thesis identifies two main research streams in the area of consumer protection and safety to focus on:

1. **Need to provide mandatory information disclosure:** information asymmetry between consumers, manufacturers, investors, and policy makers is a major determinant in preventing and managing product-harm crises. If consumers have necessary information they will be able to make optimum decisions. Manufacturers should make sure they provide the consumers with disclosure requirements set by the overseeing government agencies. Governments should update and enhance their mechanisms to remain relevant to the ever-changing consumption market conditions.
2. **Firms should know how to react and manage incidents when crises arise:** firms' management teams need to sustain a balanced position between the demands of their customers, the demands of their investors and shareholders, and the standards of the governing bodies of the market. This is usually a trade-off decision with direct effect on performance evaluation of the very managerial teams. Moreover, the delicate nature of such situations requires the decision makers to fully investigate their available strategies, prepare for those strategies in advance, and have a multi-perspective view over the stakeholders.

The present thesis explores these two streams; specifically we investigate two of the main commonplace tools: warning labels and product recalls. Both warning labels and product recalls are commonplace tools adopted by the government and active third party organizations to regulate the markets and eliminate potential risks of consumption.

Warning labels allow maintaining certain potentially-hazardous products on market shelves while reducing those hazards; and product recalls ensure that proven hazardous products are removed from the markets and consumers are compensated by the manufacturers if already purchased or consumed those products.

To do so, the present thesis employs advanced research methodologies that appropriately capture underlying drivers of consumer behaviour, market mechanisms, and the moderators that affect those relationships.

To study the effectiveness of warning labels, we adopt a meta-analysis methodology. The literature in this area of research has enough empirical evidence over a span of forty years. However, limited synthesis and conflicting study results are the main weaknesses of the literature, that make decision making difficult for policy makers. A meta-analysis is a powerful methodology that uses statistical methods and synthesizes multiple research results from different studies. A meta-analysis allows identifying patterns among contrasting study results by reporting shared statistical measures to achieve a higher statistical power for that measure of interest.

Product recalls are studied through event study methodology. Unlike warning labels literature, we pinpoint an immediate need for more empirical findings in order to delineate on moderators of such incidents. The literature of product recalls has several research gaps in that how firms should manage and handle product-harm crises. Already popular among finance and economics researchers and now a well-established research tool in the marketing domain, event study methodology is especially useful to capture the effect of critical incidents with great impact, such as product recall incidents, on financial returns of a firm.

Exploring cognitive and affective mental processes as well as impacts on financial market allows the present thesis to investigate effectiveness of the safety measures both from a consumer behaviour perspective (the first paper) and from a firm's perspective (the second paper) and has useful implications for consumers, investors, and policy makers; providing a balanced and complete view of the consumer and firm interaction. Table 1 provides an overview of the thesis structure.

Table 1: Structure Summary of the Thesis

	Essay 1	Essay 2
Level of analysis	<i>Consumer</i>	<i>Firm</i>
Tool to protect consumers	<i>Warning label</i>	<i>Product recall</i>
Methodology	<i>Meta-analysis</i>	<i>Event study</i>
Implications	<i>For policy makers</i>	<i>For firms</i>

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Chapter 1

The Effectiveness of Warning Labels for Consumers: A Meta-Analytic Investigation into Their Underlying Process and Contingencies

Abstract

Even though several meta-analyses have been conducted on the effectiveness of warning labels, many questions regarding their effectiveness remain unanswered. The authors identify 243 effect sizes from 66 primary papers, more than three times the number of effect sizes included in the most comprehensive meta-analysis to date (i.e., Argo and Main (2004) with 72 effect sizes). This updated and substantially larger dataset shows that label effectiveness is contingent on the type of expected behavioral outcome. Labels aimed at moderation/cessation display a generally diminishing cascade of effects from attention ($r = .32$), comprehension ($r = .37$), recall ($r = .31$), judgment ($r = .22$), to behavior ($r = .18$). Labels targeting safe-use show stronger effect sizes for behavior ($r = .39$) despite displaying a downward trend for attention ($r = .35$), comprehension ($r = .29$), recall ($r = .32$), and judgment ($r = .21$). Authors also find evidence of increased effectiveness when pre-activating the label by means of an integrated communication strategy ($r = .49$). In addition, results show the impact of several contextual factors, e.g., social influence ($r = .33$) and exposure frequency ($r = .12$).

Co-authors: Renaud Legoux, Francois Carrillat, Sylvain Senecal

Keywords: Warning labels. Meta-analysis. Publication Bias. Product Hazard. Tobacco. Cigarettes. Alcohol.

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1.1 Introduction

Many products on the market entail residual risks. Pharmaceutical drugs, pesticides, commonly-used chemicals, household cleaners, tobacco products, cosmetics, prepared

foods, consumable appliances and tools are examples of such products (Hieke and Taylor 2012; Earle and Cvetkovich 1995). In consumer markets, regulatory measures play a key role in helping and protecting customers, given that producers are generally willing to keep silent about potentially harmful aspects of their products (Chen, Ganesan, and Liu 2009). Thus, it is important to examine the impact of potential public policy measures prior to legislation or enactment (Bhalla and Lastovicka 1984).

Governments and third-party organizations are pushing producers to use warning labels as the means of communicating risk management issues. In a comprehensive effort by the U.S. government in 2009, the Family Smoking Prevention and Tobacco Control Act was signed into law to give the Food and Drug Administration the power to further regulate the tobacco industry. The law puts new warnings labels on tobacco packaging and also on their advertisements, mostly aimed at minors and young adults. Allowing products with residual risks to remain on the market, together with the use of warning labels, is less expensive for both manufacturers and policy makers than other forms of risk management such as recalling a product from market shelves, or engaging in long and cumbersome litigation processes (Cvetkovich and Earle 1995).

In recent years, warning labels have become increasingly subject to regulation and litigation, due to changing dietary guidelines or health and environmental concerns. Hence, application of warning labels has spread from the traditional tobacco and alcohol products to a variety of other categories such as food, environment, and pharmaceuticals. For example, the California Senate recently passed a bill requiring sugary soft drinks to carry warnings of obesity, diabetes, and tooth decay (California Centre for Public Health Advocacy 2015). Nevertheless, the current literature is focused mostly on certain products only. In the current meta-analysis, we find a large number of studies on cigarettes (104 effect sizes), chemicals (50), and alcohol (28); whereas all other product categories only amount to 60 effect sizes.

Another challenge associated with the wider range of products relying on warning labels, is whether the ubiquity of risk information defeats its own purpose. Literature is torn between two opposite perspectives on this matter. While some studies prescribe

increasing exposure to labels in order to obtain attention and message retention, others are concerned that over-exposure could result in ineffective messages due to warning wear-out (Beltramini 1988; Hassan et al. 2007; Rooke et al. 2012; Thrasher 2011).

Research on warning labels spans over 40 years and includes a few systematic reviews (e.g., Stewart and Martin 1994) and two meta-analyses (Cox et al. 1997; Argo and Main 2004). Cox et al. (1997) published a meta-analysis of 15 studies showing that, overall, on-product warning labels promote safe consumer behavior; albeit much variation in study results remain unexplained. Seven years later, Argo and Main (2004) extended this meta-analysis and addressed the issue of unexplained variance by identifying five dimensions of effectiveness based on the information processing framework (McGuire 1976). They also identified some moderating factors on the effectiveness of each dimension but were not able to draw detailed conclusions for all potential moderators due to the small number of primary studies available (Argo and Main 2004). The present paper is a complement to the previous works of synthesis in this area.

More than a decade after these meta-analytic contributions, the quantification of warning label effectiveness is still seen as puzzling by many researchers. Study results are scattered, and conflicting findings remain which undermine empirical generalizations (Kees 2010; Monarrez-Espino et al. 2014; Steinhart et al. 2013). In the same vein, within the nutritional domain, Heike and Taylor (2012) point out that most findings on warning labels are in the form of tentative and conditional statements preventing clear guidelines on their use.

It seems that the literature has not moved much farther since Stewart and Martin's (1994, p. 15) evaluation that the emphasis of policy making tends to focus more on the identification of potential hazards than on helping consumers develop an understanding of its magnitude and probability, which can be used for informed decision making. In addition, calls for investigation of new moderators remain unheeded (e.g., Kees et al. 2010). For instance, Laughery and Wogalter (2014) point out that studies focusing on labels' non-design features, such as contextual factors, are few and far between.

While prior research has identified information processing phases in the chain that leads to behavior, no theoretical predictions were presented to help policy makers. This meta-analysis (1) proposes an enhanced conceptual framework that demonstrates a cascade of effects in the chain and distinguishes between the expected behavior for safe-use type of warning messages and moderation/cessation type. Also, while the previous two meta-analyses focused on the conspicuousness (attention-grabbing) characteristics of a label, the present work (2) identifies and tests new categories of moderators unexamined in previous meta-analyses in the light of new evidence (i.e. contextual moderators). Finally, our work complements previous efforts to (3) update the big picture of the literature and address methodological issues that skew the interpretations of results, including the way they ultimately influence public policies.

Our proposed conceptual framework, based on McGuire's (1976) information processing model, is more comprehensive than previous meta-analytic research by encompassing a wide array of contingencies through investigation of the communication environment, contextual moderators, and methodological moderators. It models warning labels influence as a sequential system of effectiveness dimensions and depicts a diminishing cascade of effects throughout the chain. Our results show how the distinction between different types of expected behaviors (safe-use vs. moderation/cessation) yields important insights into labels' effectiveness useful for policy makers and researchers. In addition, investigation of new moderators offers actionable recommendations to implement more effective warning label strategies such as pre-activation of warning messages and use of influential social factors. Furthermore, a more detailed breakdown of label characteristics make way to draw new conclusions about the conspicuousness of warning labels, especially on the use of pictorial warnings. Finally, the identification of methodological moderators that systematically alter research results provides guidelines on how to best interpret study outcomes and design intervention plans.

1.2 Literature Review and Conceptual Framework

Rogers et al. (2000, p. 102) define warnings as "anything that alerts one's attention to a potentially dangerous situation." Labeling is also described as "any form of information

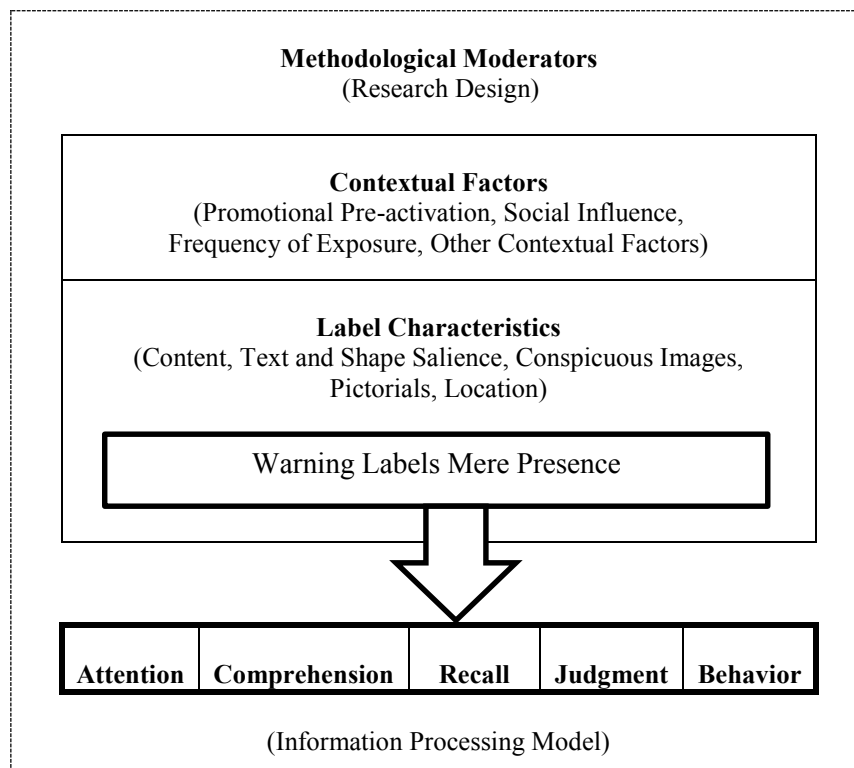
disclosure on a product” (Heike and Taylor 2012, p. 126). In line with the above, our operational definition of warning labels is that of conspicuous information vehicles that are attached to a product, or designed as part of the packaging, or included in instruction manuals or promotional material, addressing the hazards associated with use of the product. This definition clearly specifies what is to be considered a warning label or not in our meta-analysis; for instance, it excludes non-written warnings.

Labels are tools for increasing awareness of hidden aspects of product/consumption that might otherwise remain unidentified to the ordinary consumer (Argo and Main 2004; Hassan et al. 2007). Labels fulfill two general purposes: (1) to provide consumers with information they require before using the product, and (2) for manufacturers to avoid potential lawsuits (Shuy 1990).

Figure 1 depicts our conceptual framework. At the core of our framework is the effect of mere presence of a product warning label onto the five effectiveness dimensions. Mere presence is the impact of a warning label vs. lack thereof. In addition, we organize the moderating variables into the following three major categories:

1. “Label characteristics”: variables purported to optimize and enhance warning effectiveness through various design factors on the label such as message content, text salience, shape salience, location of the warning on the product, and use of pictorial elements.
2. “Contextual factors”: pertaining to the variables that are extrinsic to a label such as consumption settings and style, social influence, frequency of exposure, and promotional pre-activation.
3. “Methodological moderators”: variables that can influence research results and affect substantive interpretations, namely: publication bias and choice of research design.

Figure 1: Conceptual Model



In the most recent meta-analysis, Argo and Main (2004) undertook an examination of the factors that moderate the effectiveness of warning labels such as physical characteristics of the label (e.g., vividness-enhancing characteristics and warning location) and product categories (convenience vs. shopping goods). They acknowledged the limits of their conclusions in that they were “unable to divide these characteristics further into specific categories because of the small sample size” (p. 204). For instance, label attributes such as shape of the label or usage of icons in support of the text, were lumped together into a single “vividness-enhancing” category. With the accumulation of studies since their article, we obtain enough evidence to investigate these moderators at a more granular level, which enables us to conceive a new and broader conceptual framework. In the following paragraphs we further describe each category of moderators and develop a set of research hypotheses.

Effectiveness dimensions

Argo and Main (2004) adopted five effectiveness dimensions as dependent variables: attention, comprehension, recall, judgment, and behavior. Later, Hassan et al. (2007) used a similar set of parameters for their study (i.e., attention, elaboration, compliance contemplation, and behavioral compliance). Laughery and Wogalter (2014) simplified and summarized those steps into three broad categories: attention, knowledge, and compliance. All these frameworks can be mapped onto McGuire's (1976) original information-processing model of consumer decision-making where each of the five steps (attention, comprehension, recall, judgment, and behavior) depends highly on its antecedent in the process.

In order to better compare our study with its predecessor, we adopt Argo and Main' (2004) operationalization of McGuire's (1976) five dimensions as our dependent variables. Accordingly, the sequence of information processing depicted in Figure 1 begins with a warning label that attracts consumer's attention, followed by transmission of an effectively-crafted message which aims to influence consumer judgment and ultimately lead to behavioral compliance. Importantly, although Argo and Main (2004) explored the five effectiveness dimensions, they did not examine or theorize on their relative susceptibility to warning labels' influence.

Relying on McGuire's (1976) model, we expect to observe the largest effect sizes for attention, followed by a downward shift throughout the process. If attention can be automatic in some circumstances (Bargh, Chen, and Burrows 1996), other steps necessitate more cognitive resources. Our first hypothesis is based on the increasing cognitive effort required throughout the information processing steps. For example, comprehension can require higher-order processes, such as categorization, that are more resource intensive (Meyers-Levy and Tybout 1997) and recall implies a retrieval process that is quite effortful (Cacioppo, Petty, and Morris 1983). Further down the line, judgment is an even more cognitively-demanding task (Meyers-Levy and Tybout 1997). Finally, behavior requires physical resources in addition to psychological energy (Park et al. 2010). For cigarettes and alcohol for example, the addiction that drives consumption further impedes behavioral compliance. Thus, the magnitude of the label's

influence should become weaker along the information processing model in such a way that:

H1: The effectiveness dimensions of warning labels will display a diminishing cascade of effects from attention to behavioral compliance.

We propose that this cascade of effects is affected by the compliance objectives that are pursued by a warning label. Although all warning labels aim at preventing consumer harm, there is a fundamental distinction between labels promoting ‘safe use’ and labels promoting ‘moderation or cessation of product usage’. These two types of warning labels differ in terms of the compliance that they are designed to elicit. Safe-use labels are designed around educating the consumer to steer away from potential hazards during consumption by using the product in a manner that minimizes risk. Hence, safe-use labels are meant to change how products such as chemicals or toys are consumed. On the other hand, moderation/cessation labels are meant to reduce or even stop the consumption of a target product. Cigarettes and alcohol warning labels are typically moderation/cessation messages.

Laughery and Wogalter (2014) suggest that decision not to comply can be viewed in terms of a cost-benefit trade-off, in the sense that the costs (e.g., time, effort, money, beliefs, and/or attitudes) may outweigh the benefits of compliance. We contend that consumers mentally associate a higher cost to comply with moderation/cessation labels, compared to safe-use labels. Consumers also tend to mentally discount the future health benefits of following the advice on a moderation/cessation label (Green et al. 1994; Mischel and Grusec 1967; Rachlin and Green 1972). We do not expect a difference between safe-use and moderation/cessation early in the process. As noted before, the early steps of information processing do not require extant cognitive effort. However, the later steps are much more cognitively demanding. We expect this cost of information to be compounded by the cost of compliance. In other words, when a consumer is not willing, or able, to exert cognitive effort in the decision process (Mandler 1982), the exposure to a warning label is less likely to trickle all the way down through the chain of effects. Thus we hypothesize that:

H2: The diminishing cascade of effects will be steeper for moderation/cessation warning type than for safe-use.

Label characteristics

In the literature, a dominant strategy for improving label effectiveness has been to enhance the conspicuousness of the label by manipulating its design characteristics. These manipulations are operationalized through label message content, its textual and pictorial formats, as well as the location of the warning label on the product/packaging.

Label “Content” refers to the choices of vocabulary, the tone of the message, the use of signal words, the presence of guidance information (or lack thereof), the source of the message, and use of ANSI standard guidelines (e.g., Bansal-Travers 2011; Borland 1997; Braun 1995; Cvetkovich 1995; Dingus 1993; Wogalter 1987). Effective content characteristics warn about the hazard, explain its consequences, and provide instructions to avoid that hazard.

“Text Salience” encompasses all the characteristics of text formatting such as font color, font size, text direction, white space ratio, embeddedness in instruction text, highlighted text, etc. that make a text message more readable or noticeable (e.g., Adams 1995; Barlow 1993; Frantz 1992; Hammond 2007; Malouff 1993; Strawbridge 1986; Wogalter 1985).

“Shape Salience” includes parameters that bring more attention to the label itself such as label configuration, shape of the label, border width, package design, color of the label, etc. (e.g., Adams 1995; Barlow 1993; Bhalla 1984; Cvetkovich 1995; Goldberg 1999; Strawbridge 1986; Wogalter 1989).

“Pictorials” refer to the use of icons, graphics, pictures and images that add to the conspicuousness of a label or communicate a message without text and words (Bansal-Travers 2011; Bhalla 1984; Hassan 2007; Kees 2006, 2010; Peters 2007; Sabbane 2009a; Young 1990). In this framework we distinguish between pictorial elements that merely add to the conspicuousness of a warning label, and those images that are designed to induce an emotional response such as fear along with improving

conspicuousness. For example, warning labels on packs of cigarettes are fear-arousing and conspicuous while a ‘no-smoking sign’ is only conspicuous. In order to isolate the effect of conspicuousness from that of fear we sorted the pictorial elements into ‘conspicuous images without fear appeal’ and ‘conspicuous images with fear appeal’ categories. The former category facilitates cognitive process by increasing readability, and overcoming language barriers and illiteracy issues, while the latter has an added impact on consumers by inducing a negative emotion towards consumption (Kees et al. 2010).

“Location” of a warning label on a product, or in relation to other package design elements (e.g., inclusion in the instructions for use), can also affect whether a warning label is noticed. Some locations are known to be more conspicuous than others (e.g., front rather than back or side). Thus, location of the label is positioned under label characteristics category (Barlow 1993; Frantz 1993; Magurno 1994; Torres 2007; Wogalter 1992).

Table 1 summarizes our categorization of label characteristics together with commonly-used terms and keywords as they appear in the literature. By manipulating such design characteristics, a label becomes more conspicuous (e.g., with a larger font size, or a more noticeable shape), attracts more consumer attention, and facilitates comprehension and recall, all of which enhance overall label effectiveness. The key underlying notion is that conspicuousness leads to a more effective label (Barlow 1993; Young 1990). Thus, we expect that:

H3: The conspicuousness of label characteristics is positively associated with label effectiveness.

Table 1: Summary of Coding Scheme for Dependent and Independent Variables

Notation in our framework	Notation from literature	Example studies
Attention	Notice, seeing the warning, conspicuousness, salience of warning, awareness, attention to ad, attention to brand.	<i>Bansal-Travers 2011, Hammond 2007, Hassan 2007, Torres 2007, Borland 1997, Braun 1995, Barlow 1993, Magurno 1993 and 1994, Mazis 1991, Jaynes 1990, Bhalla 1984, Goldhaber 1988 and 1989.</i>

Comprehension	Reading the warning, readability, looking at the WL for longer time, comprehension, knowledge, depth of processing.	<i>Peters 2007, Hassan 2007, Braun 1995, Magurno 1994, Frantz 1993, Kalsher 1991, Young 1990, Otsubo 1988, Strawbridge 1986, Bhalla 1984.</i>
Recall	Free recall of message, cued recall, memory of the warning, recall the danger, recall of shaking the bottle, recall safety instructions, report accurately, memory of the risks, identify driving message among a few options	<i>Kees 2010, Torres 2007, Chowwanapoonpohn 2005, Goldberg 1999, Barlow 1993, Malouff 1993, MacKinnon 1993, Wogalter 1992, Mazis 1991, Jaynes 1990, Young 1990, Gardener-Bonneau 1989, Goldhaber 1989, Orr 1988, Otsubo 1988, Karnes 1986, Strawbridge 1986, Bhalla 1984.</i>
Judgment	Brand attitude, website attitude (with cigarette ad), package attractiveness, perceived safety, perceived hazard, urgency of warning label, belief in paralysis, think about health risks, truthfulness, believability, perceived likelihood of injury, think wine or whiskey is dangerous, elaboration on harm.	<i>Adams 1995, Bansal-Travers 2011, Borland 1997, Braun 1995, Cvetkovich 1995, Frantz 1992, Goldhaber 1988 and 1989, Hammond 2004, Hassan 2007, Hatem 1995, Kaskutas 1993, Kees 2006 and 2010, Magurno 1994, Sabbane 2009, Wogalter 1987.</i>
Behaviour	Compliance, purchase intention, use of mask or gloves, smoking intent, motivate to quit, perceived effectiveness to encourage others to quit, wearing protective tools, shaking the bottle, more likely to dive, stubbing out a cigarette at least once, smoke less, Quit likelihood, Quit confidence, alcohol use, drinking less.	<i>Bansal-Travers 2011, Borland 1997, Braun 1995, Desaulniers 1987, Dingus 1991 and 1993, Frantz 1992 and 1993, Godfrey 1985, Goldhaber 1988 and 1989, Hammond 2004, Hankin 1998, Hassan 2007, Kaskutas 1993, Jaynes 1990, MacKinnon 2001, Magurno 1994, Sabbane 2009, Schucker 1983, Strawbridge 1986, Torres 2007, Wogalter 1985 and 1987 and 1989 and 1992 and 1993.</i>
Content	Prominence, signal words, presence of guidance information, ANSI standard, procedural explicitness, source of message, specificity.	<i>Bansal-Travers 2011, Borland 1997, Braun 1995, Cvetkovich 1995, Dingus 1993, Wogalter 1987.</i>
Text Salience	Conspicuous print, font color, font size, text direction, embeddedness in instruction text, highlighting text, white space.	<i>Hammond 2007, Adams 1995, Barlow 1993, Malouff 1993, Frantz 1992, Strawbridge 1986, Wogalter 1985.</i>
Shape Salience	Conspicuousness of label configuration, shape of the label, package design, border width.	<i>Goldberg 1999, Adams 1995, Cvetkovich 1995, Barlow 1993, Wogalter 1989, Strawbridge 1986, Bhalla 1984.</i>
Picture	Text vs. picture, pictorial icons, visual information factor, graphic images.	<i>Bansal-Travers 2011, Kees 2006 and 2010, Sabbane 2009a, Hassan 2007, Peters 2007, Young 1990.</i>
Location	Location of warning label, label location relative to instructions on product.	<i>Torres 2007, Magurno 1994, Frantz 1993, Barlow 1993, Wogalter 1992.</i>
Promotional Pre-activation	Conspicuousness of Location of warning label (off-product), location of warning in print ads, ads on the wall, TV ads.	<i>Barlow 1993, Torres 2007.</i>
Frequency of Exposure	Frequency of noticing a warning, substance use frequency, cigarettes per day, lifetime cigarette use, alcohol use, smoking habits.	<i>Borland 1997, Goldhaber 1988, MacKinnon 1993, Gardener-Bonneau 1989, Cantrell 2013, Beltramini 1988, Hassan et al. 2007, Rooke et al. 2012, Thrasher 2011.</i>
Social Influence	Situation of administration of the test, presence of a confederate.	<i>Cvetkovich 1995, Wogalter 1989.</i>

Other Contextual Factors	Low vs. medium cost of compliance, cost of compliance, product type.	<i>Braun 1995, Dingus 1991 and 1993, Wogalter 1987 and 1989.</i>
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Contextual factors

Consumer behavior is highly susceptible to environmental influences (Dickson 1996; Erdem 1996; Foxall and Yani-De-Soriano 2005); however, previous meta-analyses have not fully examined the impact of contextual moderators on the effectiveness of warning labels. This is an important shortcoming considering that the most appropriate unit of analysis of behavior is person-activity-occasion rather than any one component taken individually (Yang, Allenby and Fennel 2002).

Following Belk's (1974) suggestion that a factor of behavioral influence is contextual if it does not pertain to the realm of either the consumer or the product, we considered the following moderators to be contextual in nature: pre-activation of the warnings in promotional campaigns, social influences (e.g., Cvetkovich 1995; Wogalter 1989), and frequency of consumer exposure to a warning (e.g., Borland 1997; Goldhaber 1988; MacKinnon 1993). Other contextual parameters (e.g., physical cost of compliance), which did not yield enough eligible primary studies to be examined as a group of moderators, were collected under "Other" in the contextual factors category.

"Promotional pre-activation" is coded according to manipulations of the medium carrying the warning label (on-package vs. off-package), and posits that warning labels can feature in advertisements and other promotional materials, in addition to appearing on products. This ancillary communication activates the warning message in the consumer's mind prior to purchase or consumption; leading to higher compliance (Dillman 2000; Haggett and Mitchell 1994). Supporting the warning message through promotional pre-activation is akin to sales promotion activation. For example, Neslin (2002) compares the effectiveness of sales promotions with and without promotional activation and finds that pre-activating a price cut promotion can increase sales by up to 545% compared with a 35% increase when the sales promotion is not activated. Thus, we expect that:

H4: Promotional pre-activation is positively associated with label effectiveness.

“Social influence” takes into account the fact that consumption behaviors can vary significantly according to whether a product is used privately or in a social context. Impression management theory indicates that in social situations consumers will often act with the awareness that others are watching them (e.g., Ariely and Levav 2000; Ratner and Kahn 2002). Hence, in the presence of other people, consumers are likely to be willing to display an impression of paying attention and conforming to social norms. For instance, Wogalter et al. (1989) altered warning compliance in a study simply by having a silent confederate present during a lab experiment while the subject filled out a questionnaire on smoking habits. Consequently, we propose that:

H5: Social influence is positively associated with label effectiveness.

Laughery and Wogalter (2014) underline that understanding a warning does not necessarily ensure that it will be recalled at the proper time. To tackle this issue warnings tend to be ubiquitous and repetitive. Indeed, the effectiveness of increasing ‘exposure frequency’ of warnings is a matter of debate in the literature. On one hand, it could be that frequent encounters with a warning label revive pieces of latent or dormant knowledge and lead to higher compliance. For instance, Borland (1997) suggests that individuals who are repeatedly exposed to warning labels think about smoking dangers more frequently and comply more easily. On the other hand, frequency could lead to over-exposure making the label’s effectiveness subject to wear-out (e.g., Beltramini 1988; Hassan et al. 2007; Thrasher 2011) due to a habituation effect (Rooke et al. 2012). After a certain level of exposure, adaptation may set in and consumers might start ignoring the warning message by activating mental barriers that degrade the intended effects (Abelson 1976). To illustrate, Gallopel-Morvan’s study (2009) suggests that French people no longer react to old and tired textual warning labels.

While conceptually compelling, the adaptation argument does not have strong empirical support in the context of warning labels; a lack of evidence that can be attributed to the exposure frequencies tested being usually restricted to the lower end of the experimental region. Thus, we side with Borland’s (1997) view in that:

H6: Frequency of exposure is positively associated with label effectiveness.

Methodological moderators

The warning label literature comprises various research designs, namely: laboratory experiments, field experiments, and surveys. These designs have differing capabilities to “maximize systematic variance, control extraneous systematic variance, and minimize error variance” (Kerlinger and Lee 2000, p. 456). While laboratory experiments, field experiments, and surveys are equally able to minimize error variance, they differ on the two other sources of variance.

Experimental treatments are best for controlling systematic variance and field experiments do not allow the researcher to calibrate precisely the modality and strength of manipulations, while surveys rely on the naturally occurring variance among the variables of interest (Pedhazur and Schmelkin 1991). By manipulating only the variables of interest, while ideally keeping all other sources of extraneous variance constant, experiments are superior in that respect. By contrast, field experiments and surveys are exposed to an array of nuisance variables beyond the control of the researcher (Pedhazur and Schmelkin 1991). Our data collection reveals that warning labels have been analysed more frequently through experiments (153 effect sizes), than by means of the other two combined: field experiments (30), and surveys (59). Researchers should be aware of characteristics of each design in interpretation of research results. While field experiments and surveys are subject to independent variable validity threats which can attenuate the strength of the observed effect size (Hunter and Schmidt 2004), experiments are prone to effect size inflation. Therefore, we hypothesize that:

H7: Laboratory experiments will display the strongest effect sizes followed by field experiments and then surveys.

1.3 Method

Study collection

We collected studies for coding based on Cooper's (1998) guidelines for conducting a thorough literature search, in four major steps. First, we retrieved the pool of studies identified by Argo and Main (2004). Next, we extended our list by identifying the papers they cited or the papers that later cited them. We then complemented these steps by using both computer-based search procedures and manual search via (1) portals of scientific journals and academic databases through ProQuest and JSTOR to include the most relevant marketing papers, and Google Scholar gateway (keywords: "warning label", "warning*", and "label*") to make sure we retrieved all the eligible papers, and (2) conference papers (e.g., Proceedings of Human Factors Society). Finally, we also included three published and unpublished thesis reports that we identified through a dissertation database. To overcome the limitations of computer-based literature resources, we took advantage of inter-library document transfer services to access older papers or those which were not available online. Our initial search yielded 123 papers in total.

We set the following inclusion criteria according to general guidelines put forth by Hunter and Schmidt (2004, pp. 471-478): (1) The study should include quantitative reports (this condition leaves out qualitative works and conceptual papers); (2) The study should measure the effect of an actual warning message framed as a label rather than the evocation of a label (it leaves out lab simulations of warning messages that are not carried by a label such as Munoz et al. 2010); (3) The impact of the independent variables (e.g., text, shape salience, picture, etc.) should be assessed on at least one of the five dimensions of effectiveness (it leaves out studies with other tested dependent variables such as relapse of behavior as in Partos et al. 2013); (4) The sample should be comprised of consumers rather than 'patients' or 'addicts'. We are interested in the effectiveness of warning labels within the general population as a prevention rather than as a treatment (it leaves out pathological users, addicts, former addicts, etc. and the studies conducted within a purely medical setting). Furthermore, this condition is important to keep consistency with Argo and Main's meta-analysis (2004); and (5) The study should report sufficient information that allows for the computation of effect sizes usable in a meta-analysis (e.g., having key pieces of quantitative data or displaying adequate methodological information in terms of study design) as explained by Hunter

and Schmidt (2004). On the basis of these criteria, 66 papers were eventually included in the meta-analysis amounting to 80 studies.

Our pool of primary studies show an enhancement compared to its predecessor: Argo and Main (2004) included 72 effect sizes from 39 papers (covering the 1983 to 2002), our search process yielded 243 effect sizes from 66 papers covering from 1983 to June 2014. The larger number of collected effect sizes reflects a larger number of included studies and a more comprehensive coding scheme required for incorporating a wider range of moderators.

Effect size coding

We coded the effect sizes according to recommendations by Lipsey and Wilson (2001). Correlational reports and other statistics that could easily be translated into correlation such as chi-square, F-test and t-test, contingency table data, and frequency data were integrated. Odds-ratio effect sizes and standardized mean differences (Cohen's d) were appropriately coded into correlational r along with their respective sample size. If raw data was present in the form of tables, coders recalculated the effect size and compared it to the reported statistics for improved accuracy. Each effect size was then weighted by its sample size (Hunter and Schmidt 2004).

Coders then classified each moderator into different categories: mere label presence, label characteristics category, contextual factors category, or methodological factors. Note that moderators were included only if there were at least five effect sizes available (Palmatier et al. 2006). Our coders coded for 'fear' to distinguish between conspicuous image graphics and fear appeal graphics. Primary studies were also coded for including a no-warning control group (to detect the effect of mere presence of a warning label vs. varying levels of manipulation). In the case of various conditions with varying label characteristics, we compared the conditions two by two and extracted the effect sizes, correcting each individual effect size for its nested nature using HLM models.

Coders followed Rogers et al. (2000) and operationalized the dependent and independent variables adjusted by their own interpretation if necessary. For example,

whereas a study may deem to assess comprehension, it might measure warning recall instead. Coders closely monitored such operationalizations. See Table 1 for more details.

Analysis

We used Hunter and Schmidt's (2004) more conservative random effects model rather than the fixed effects model. Because this model allows for the possibility that effect sizes may come from distinct populations, they allow population parameters to vary freely and provide estimates of their variance.

We followed Bijmolt and Pieters (2001) in dealing with multiple measurements at the article level, study level, and effect size level by adopting a general model with a nested error structure in a complete set of measurements. The simplified general model is depicted below:

$$y_{es} = \beta_0 + \sum_{k=1}^K \beta_k x_{a,s,es} + r_a + u_s + e_{es} \quad (1)$$

Where y_{es} is the measurement of the effect size and $x_{a,s,es}$ is the denotation for moderator variables at the article, study, and effect size levels. In this model, measurements of the effect size are not independent within a study, leading to a nested error structure. The nested error structure decomposes the error variance into three error terms, namely, r_a at the article level, u_s at the study level, and e_{es} at the effect size level which corresponds to the general error term of the model. Error components r_a , u_s , and e_{es} are assumed to be normally distributed with zero mean and variances σ_a^2 , σ_s^2 , and σ_{es}^2 , respectively.

Data analysis was performed using Raudenbush and Bryk's (2002) hierarchical linear models (HLM) based on 243 effect sizes collected from 80 studies nested within 66 articles. This high embeddedness of the data indicates that a multi-level approach is best suited to perform a fully hierarchical analysis of moderators. Although most meta-analyses in this area have not adopted HLM approach, the importance of data hierarchies in meta-analyses is a key to making appropriate assumptions. Despite being less obvious than repeatedly gathered data on an individual subject, hierarchy of data in a meta-analysis exists because of subjects, results, procedures, and experimenters that

are nested within a study (Bryk and Raudenbush 1992). A deviance test demonstrated that giving up some parsimony by adopting a 3-level structure was warranted since a model estimating the overall effect size with the 3-level specification fits the data better than a 2-level model ($\Delta\chi^2 = 42.8$, $df = 1$, $p < .001$) or a fixed effect model ($\Delta\chi^2 = 174.9$, $df = 1$, $p < .001$).

Whereas many meta-analyses evaluate moderator effects one after the other (e.g., Argo and Main 2004; Verlegh and Steenkamp 1999), it requires the assumption of moderators independence which effects are additive (Hunter and Schmidt 2004). This assumption is not satisfied in the field of warning labels since moderators overlap in the effect sizes they include. For example, because studies on pictorial warning messages are found mainly for cigarettes and are mostly set in a laboratory, pictorial moderators cannot be studied without accounting for methodological moderators.

To tackle the problem of correlated moderators, we adopted a multiple-regression approach to test the effect of all moderating variables in the model at once. This is critical because it circumvents the issue of potentially confounding effects and leads to more accurate estimates of interdependent moderators (Hunter and Schmidt 2004).

Credibility intervals and confidence intervals were calculated according to Hunter and Schmidt (2004), Whitener (1990), and Arthur et al. (2001). In meta-analyses, credibility intervals indicate the plausible values of the effect size that may be found in any given primary study. Confidence intervals describe how much error is included in the estimate of a parameter (Jaramillo, Carrillat, and Locander 2005). We used SAS software version 9.2 to perform our analyses and the estimation method was Maximum Likelihood (ML).

1.4 Results

In total, the studies sampled 33,243 participants and covered various parameters. Tables 2a, 2b, 3, and 4 report the mean effect sizes (ES) for each parameter alongside the number of effect sizes (k), the cumulated sample size (n), the standard error (SE), the confidence intervals, and credibility intervals. They are presented in separate tables for reader convenience despite being estimated simultaneously using a single hierarchical meta-regression model.

Diminishing cascade of effects

Table 2a shows that warning labels moderately attract consumer attention ($ES_{\text{Attention}} = .33$ [.24 - .42]), followed by moderate effect sizes for both comprehension and recall of the message ($ES_{\text{Comprehension}} = .31$ [.21 - .42]; $ES_{\text{Recall}} = .31$ [.22 - .39]). The relationships between warnings and judgment as well as behavior drop to the small effect size range defined by Cohen (1988) ($ES_{\text{Judgment}} = .25$ [.18 - .32]; $ES_{\text{Behavior}} = .29$ [.22 - .35]).

Following McGuire (1976), we expect a diminishing cascade of effects throughout the information processing steps. However, despite a downward trend that conformed to our prediction, the linear test is not significant ($t\text{-value} = -1.10$, $p > .05$), thus Hypothesis 1 is not supported. However, when distinguishing expected behavior (compliance) into safe-use vs. moderation/cessation, the cascade of effects emerges. For moderation/cessation labels the effectiveness dimensions follow a downward linear pattern ($t\text{-value} = -2.55$, $p < .05$) whereas there is no such decreasing trend for safe-use labels ($t\text{-value} = .81$, $p = .42$). This supports Hypothesis 2.

Table 2a: Effectiveness Dimensions

	K	n	r	SE	Confidence Interval		Credibility Interval	
Attention	29	17036	.33	.04	.24	.42	-.14	.80
Comprehension	21	7138	.31	.05	.21	.42	-.18	.80
Recall	48	6433	.31	.04	.22	.39	-.27	.88
Judgment	63	8189	.25	.04	.18	.32	-.33	.82
Behavior	82	26861	.29	.03	.22	.35	-.30	.88

As seen in Figure 2, the effect sizes of moderation/cessation and safe-use labels are comparable from Attention to Judgment. As evident in Table 2b, the confidence intervals of these effect sizes greatly overlap. However, cessation/moderation labels are associated with markedly lower effect sizes for behavior ($ES_{\text{Moderation/Cessation}} = .18$ [.09-

.27] vs. $ES_{\text{Safe_use}} = .39$ [.31-.47]). Notice that the two confidence intervals do not overlap.

Figure 2: Comparing the Cascade of Effects (Safe-use vs. Moderation/cessation)

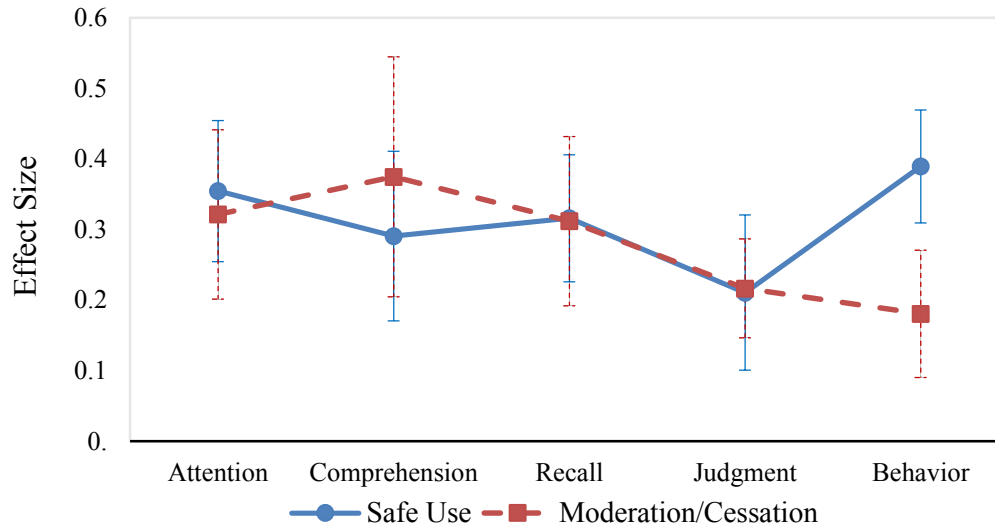


Table 2b: Effectiveness Dimensions for Moderation/cessation vs. Safe-use

	Moderation/cessation				Safe-use			
	r	SE	Lower	Upper	r	SE	Lower	Upper
Attention	.32	.06	.20	.44	.35	.05	.25	.46
Comprehension	.37	.09	.20	.55	.29	.06	.17	.42
Recall	.31	.06	.19	.44	.32	.05	.22	.41
Judgment	.22	.04	.13	.30	.21	.06	.10	.33
Behavior	.18	.05	.09	.27	.39	.04	.31	.47

Mere presence, label characteristics, and contextual factors

Table 3 shows the results for mere presence, as well as for label characteristics and contextual moderators. The mere presence of a label tests the general effect of warning labels as communication vehicles compared to their absence, whereas label characteristics focus on the incremental improvements from modifying specific label

attributes. The mere presence of a label is associated with a significant effect size of .24 [.15 - .34].

Label characteristics: According to Table 3, content has a small effect size ($ES_{\text{Content}} = .25$ [.14 - .35]) and so do text salience ($ES_{\text{Text-Salience}} = .19$ [.07 - .31]) and shape salience ($ES_{\text{Shape-Salience}} = .22$ [.07 - .37]). A more noticeable location of the label on the product ($ES_{\text{Location}} = .32$ [.09 - .55]) has a moderate effect size (Cohen 1988).

Regarding the ‘pictorial’ characteristics of labels, images drawing on fear elicitation seem to yield a stronger effect size ($ES_{\text{Conspicuous-image-with-Fear}} = .23$ [.13 - .33]) than those with conspicuous-only images, which are not statistically different from zero ([-.10 - .16]). Indeed, we find the difference between conspicuous pictures with fear appeal and those displaying conspicuous-only pictures statistically significant ($t\text{-value} = 2.44$, $p < .05$).

In sum, these results support Hypothesis 3 in that conspicuousness of text, shape, and location, drive label effectiveness. Image conspicuousness, however, is a notable exception in that it seems to require a fear appeal to reach a similar effect size as other label characteristics. In all, since most effect sizes associated with label characteristics are positive and significant, Hypothesis 3 is generally supported. Note that the evidence for conspicuousness characteristics is in line with the findings of Argo and Main (2004); however, our results allow disentangling the effect of image conspicuousness when fear appeal is removed, and a more granular assessment of conspicuousness moderators, which Argo and Main’s (2004) smaller sample size did not allow.

Table 3: Label Characteristics and Contextual Factors

	K	n	r	SE	Confidence Interval		Credibility Interval	
Mere Presence	52	13267	.24	.05	.15	.34	-.20	.68
Label Characteristics								
Content	27	2641	.25	.05	.15	.35	-.19	.69
Textual Salience	28	4870	.19	.06	.07	.31	-.29	.67

Shape Saliency	19	2456	.22	.08	.07	.37	-.33	.77
Conspicuous Image	18	786	.03	.06	-.10	.16	-.45	.51
Picture with Fear Appeal	53	23715	.23	.05	.12	.33	-.21	.67
Location on Product	9	838	.32	.12	.09	.55	-.36	1.00
Contextual Factors								
Promotional Pre-activation	6	622	.49	.11	.27	.72	-.16	1.00
Frequency of Exposure	20	13446	.12	.06	-.004	.23	-.36	.60
Social Influence	5	358	.33	.13	.08	.58	-.38	1.00
Other Contextual Factors ¹	6	651	.28	.09	.09	.47	-.31	.87

Contextual factors: The promotional activation effect size is substantial at .49 [.27 - .72] compared to label characteristics, which supports Hypothesis 4. Social influence ($ES_{\text{Social}} = .33$ [.08 - .58]) shows a moderate effect size, supporting Hypothesis 5. We do not find a significant effect size for frequency of exposure ($ES_{\text{Frequency}} = .12$ [-0.004 - .23]). Thus Hypothesis 6 is not supported.

There are other contextual factors that could not be grouped homogeneously or be grouped within any of the categories presented above. For instance there were only four eligible articles that dealt with cost of compliance (Dingus 1991, 1993; Wogalter 1987, 1989). Those parameters are analysed under “Other” and exhibit a significant and small effect size of .28 [.09 - .47].

Methodological moderators

As shown in Table 4, the effect size for field experiments falls between the two types of lab experiments ($ES_{\text{Experiment_w_control}} = .32$ [.23 - .41]; $ES_{\text{Field-experiment}} = .31$ [.16 - .45]; $ES_{\text{Experiment_w/o_control}} = .23$ [.12 - .33]), but is not significantly different from either type ($t\text{-value} = -1.26$, $p = .21$ for the comparison with experiments with control group; and $t\text{-value} = .27$, $p = .79$ for comparison with experiments without control group).

¹ e.g., physical cost of compliance

Table 4: Methodological Moderators

	K	n	r	SE	Confidence Interval		Credibility Interval	
Study Design								
Experiments w/o Control Group	96	14101	.23	.05	.12	.33	-.21	.67
Experiment with Control Group	58	3251	.32	.05	.23	.41	-.12	.76
Field Experiment	30	3428	.31	.07	.16	.45	-.21	.83
Survey	59	28582	.14	.06	.03	.24	-.34	.62

Surveys yield a small effect size ($ES_{\text{Survey}}=.14$ [.03 - .24]). Indeed, they are significantly different from experiments with control group ($t\text{-value}=3.28$, $p<.05$) and from field experiments ($t\text{-value}=2.16$, $p<.05$), but not from the experiments without a control group ($t\text{-value}=1.41$, $p>.10$).

As reasoned for Hypothesis 7, the larger effect size of lab experiments was expected due to their more powerful designs. However, an alternative explanation is that because the review process favors papers with significant results, the usually small sample sizes of experiments require stronger effects to yield significant results. This phenomenon results in a publication bias (Greenwald 1975), which a meta-analysis can detect (Hunter and Schmidt 2004). We used three different methods to test for publication bias: Begg's rank correlation, Egger's regression method, and a funnel plot regression. The logic of these three methods is that if publication bias inflates effect sizes within experimental designs, sample size and effect size should be negatively associated. On the other hand, if experimental control is responsible for the larger effect sizes, they should be unrelated to sample size. Importantly, none of the above-mentioned tests show a negative relationship between sample and effect sizes, thus failing to support the publication bias explanation. Hence, Hypothesis 7 is partially supported in that surveys produce smaller effect sizes than experimental methods (lab and field experiments); but experiments in the field did not yield smaller effect sizes than the ones in the lab.

1.5 General Discussion

This meta-analysis provides numerous enhancements relative to its predecessors. Methodologically speaking, it uses tools and methods that are more appropriate to the structure of the studies examined, enabling this work to confirm some of the conclusions of earlier works while developing others. Argo and Main (2004) underlined the size of their sample of studies as a challenge in detecting influential moderators. By using HLM methods and by increasing the span of data collection (1983 to 2014), our analysis addresses this issue and includes more than three times the number of effect sizes compared to Argo and Main (2004) (243 vs. 72 effect sizes). Our results are enhanced by a random effects model which accounts for the nested nature of the collected effect sizes, and a meta-regression approach which accounts for possible confounds.

We introduce a new conceptual framework for studying warning labels. Our framework models information processing as a sequential system of effectiveness dimensions. Depicting a diminishing cascade of effects enables our model to offer an important insight into the difference between two types of warning labels. Moreover, our framework brings to consideration a new set of contextual moderators which pertain to social and contextual awareness of warning messages. Also, there are comprehensive findings about label characteristics especially on the use of pictorials. Finally, we discuss those methodological moderators that may skew results and affect their interpretation.

Distinction between safe-use and moderation/cessation

Consistent with the information-processing model, we observe that in moderation/cessation warning type, behavior follows the downward trend as expected after attention, comprehension, recall, and judgment. However, safe-use warnings elicit more favorable behavioral changes. In fact, while the diminishing cascade of effects prevails until the judgment phase (both safe-use and moderation/cessation warnings produce statistically similar effect sizes in the earlier four steps), the question is what seems to facilitate compliance in safe-use warnings? Note that if safe-use warning has a stronger effect size on behavioral compliance compared to cessation/moderation, these

two types of labels have similar impact on judgment. The distinction of safe-use vs. moderation/cessation reveals three important issues:

First, the threat is credible and usually instant in safe-use warning types: for example, users would instantly feel the burn in the eyes and suffer considerable loss of eye sight if the industrial chemical substance comes in contact with their eyes. On the other hand, a cancer threat that a tobacco/alcohol user may or may not have to deal with, whether or not they live long enough as a smoker/drinker, is less certain and obviously not instantaneous. Not only is that reflected in the moderation/cessation warning messages that such products bear, but also most users have heard (or perhaps told) several stories of a long-time smoker who is still healthy.

Second, in safe-use warning type, the expected compliance improves the consumption experience by ensuring user safety: for example, wearing gloves or goggles keeps the user safe while providing the expected utility intended from the chemical substance. However, a reasonable compliance instruction is usually missing from moderation/cessation warning type and at best the warning message suggests that the consumer should forego consumption of the product altogether.

Third, moderation/cessation labels stigmatize consumption, which imposes a negative self-concept on consumers. By directly discouraging consumption (e.g., anti-smoking messages warn about negative consequences of the very act of smoking), moderation/cessation labels attach a psychological cost to processing that information because the user engages in maintaining self-consistency and ego protection. On the other hand, safe-use messages are usually aligned with user's consumption goals and intervene only to instruct how to avoid potential hazards (e.g., avoid contact with chemical substance).

According to Swann et al. (1987), consumers with already negative self-concept (e.g., "I am a smoker."), perceive a negatively-framed message (i.e., moderation/cessation labels) as more self-descriptive rather than as a source of motivation for self-enhancement through behavioral change. As a result, they engage in cognitive self-consistency strategies (justifying smoking) rather than self-enhancement (decrease or

quit smoking). Such strategies undermine the opportunities to change behavior by engaging consumers in activities that perpetuate their (already negative) self-view. Stewart and Martin (1994) offer a detailed discussion on the psychological roots of such behavior among some consumers and suggest a link to psychological reactance (Stewart and Martin 1994, p. 11).

The distinction between safe-use and moderation/cessation is a key finding with important consequences for future public policies. Is there a way to improve behavioral compliance for the products currently bearing moderation/cessation warnings and replicate the satisfactory results that we have observed in safe-use warning type? For example, since 2004 the Centre for Disease Control (CDC) has claimed obesity as a “prominent public health epidemic” with over 30% of US adults challenged with this issue (Fryar et al. 2012; Seiders and Petty 2004). Packaged food products and soft drink beverages, already carrying enhanced nutritional information labels (Food and Drug Administration, February 2014), are on the verge of being subjected to changed warning labels and nutritional value tables in North America. In 2015, California lawmakers voted to put warning labels on all advertisements for sugary beverages. As part of an effort aimed at reducing health problems linked to consumption of high-calorie drinks, new legislative trends are emerging to incorporate warning labels on prepared food products the way one would see with tobacco or alcohol. It may only be a matter of time before it goes nationwide (or worldwide). The upcoming warnings read:

Drinking beverages with added sugar(s) contributes to obesity, diabetes, and tooth decay.

This is a message from the City and County of San Francisco.²

This is an opportunity for policy makers to be reminded that traditional moderation/cessation labels are hardly the silver bullet to eliminate such harmful consumptions, given their weaker impact on compliance, threat credibility issues, and the self-consistent cognitions that they evoke.

² <http://time.com/3915485/san-francisco-soda-warning-label/>

A greater public policy challenge is that it seems virtually impossible for policy makers to imagine a ‘safe-use’ type of warning message for product categories such as food, beverages, cigarettes, or alcohol. In other words, policy makers have not yet imagined a warning that suggests a safer consumption for a potentially-harmful product, while at the same time respecting users’ consumption choices of legally purchased products. In the light of our results, we suggest that warning labels reframed in a safe-use format could better contribute to reducing harmful consumptions as such.

The following illustrates the difference between moderation/cessation and safe-use warning messages. Rather than alerting of a future health problem within 50 years (e.g., drinking sugary soda will cause diabetes), a warning label on a sugary beverage may suggest that “to burn the current amount of sugar intake (in calories), consumer must run for 20 minutes or partake in 30 min of average-to-high physical activity”. In this manner users are told how to consume the product safely: making sure that their energy intake is balanced with their energy expenditure by monitoring their activity level. An added benefit resides in the transposition of calories; a rather abstract quantification of energy, into equivalent quantities that most consumers can relate to such as time spent exercising. Indeed, in early 2016 the George Institute for Global Health in Australia issued a list of the worst offenders in the junk food category with the equivalent running time necessary to burn them off (Sydney Morning Herald 2016) .

Importance of contextual moderators

Our second theoretical contribution in this meta-analysis is accounting for contextual parameters. Two major contextual moderators i.e., promotional pre-activation and social influence (for socially-consumed products such as food, tobacco, or alcohol) yield medium effect sizes compared to a range of small effect sizes yielded by label characteristics parameters. In other words, we can conclude that although label characteristics can affect the effectiveness of the warning labels, they do not enable warning labels to reach their full potential. Curiously, a quick look at the published primary studies reveals that despite the enhanced effectiveness of warning labels found on products used in social settings of that are pre-activated, less than 19% (one in five)

of the primary studies have included contextual parameters in investigating warning labels. Thus, we suggest that researchers and policy makers alike should expand their span of focus from being limited to the physical design of the label to include contextual moderators.

Our results show that social influence is a moderate driver of effectiveness (compared to mostly small effect sizes of label characteristics). The low number of primary studies investigating social influences (five effect sizes) proves that this aspect of warning labels is greatly understudied; compared to over 50 effect sizes for health-related warning messages. One of the avenues for researchers is to compare the effectiveness of social cues and health-related cues in terms of cognitive change and behavioral compliance. Much of human behavior is influenced by immediate feedback from social cues. In a trade-off between immediate social consequences and long-term health issues, social cues usually prevail (Hari 2015). Consumers are more likely to discount future health consequences than an immediate socially-wired consequence at the very time of consumption. Hence, social cues can be used to emphasize on shorter-term negative effects of consumption. Policy makers can benefit from forming warning messages around building negative social consequences (immediate effect) rather than long term negative health consequence. This shift in approach is especially important for products that are commonly consumed in social contexts such as cigarettes, alcohol, soft drinks, food products, etc. In particular, policy makers should note that social consequences play an even more critical role among young smokers and women, who are the most vulnerable consumers in the face of health challenges (Denscombe 2001).

Obviously, such social cues may not be effective for products that do not have a social element to their consumption. For a domestically-consumed chemical product, a warning on the immediate consequences (e.g., burn of skin, eye damage, etc.) would suffice. A good example of a warning message using social influence (threat of erectile dysfunction due to smoking) can be found in O'Hegarty et al. (2007) discussing six Canadian health warning labels placed on cigarette packages. They show that consumers find the image incorporating social disadvantages of smoking to be more effective in creating compliance than others (health related only).

We also find a substantive effect size for promotional pre-activation. Promotional pre-activation (i.e., integrating warnings into integrated marketing campaigns) can be as important and powerful as on-package warnings. In fact, there is a body of research showing that an integrated approach is more persuasive than an isolated communication (Dillman 2000; Hagget and Mitchell 1994; Neslin 2002). Including warning messages in marketing campaigns prompts and activates the information in consumer's mind in advance and influences their judgment more effectively. In fact, under the U.S. Family Smoking Prevention and Tobacco Control Act (2009) smokeless tobacco products are already required to bear warning labels in their advertisements and promotional campaigns. Our findings provide support for this course of action.

However, in integrating warnings in promotional campaigns, policy makers must consider three possible barriers: (1) there is a high cost in convincing producers to run marketing campaigns in compliance with warning requirements; and (2) this strategy increases the frequency of message exposure, potentially leading to over-exposure and wear-out effects, and (3) exacerbation of false alarm effect (Chowdhury et al. 2014).

Convincing producers to include warning messages that discourage consumption of their products in their marketing campaigns seems only possible through forceful legislation [and litigation]. Producers in the food industry do not include sensitive nutritional facts and warning labels in their advertisements and promotional campaigns, holding customers responsible for their consumption choices. The industry's position so far has been to refuse the obligation to activate warning labels, arguing that no food has been proven to inherently be good or bad, or cause obesity per se (Seiders and Petty 2004).

The type of influence that frequency of exposure exerts is difficult to ascertain. The literature is divided between two opposite perspectives; indeed, we did not observe a significant aggregate-level effect size for frequency of exposure. Some researchers prescribe increasing exposure to reassure attention and message retention while others are concerned with the negative over-exposure effect, and suggest that it could result in message wear-out (Beltramini 1988; Hassan et al. 2007; Rooke et al. 2012; Thrasher 2011). This debate warrants further investigation, given that integrating warnings in

advertisements would naturally increase message exposure. Frequency of exposure is believed to follow an inverse U-shape function (for a meta-analysis on exposure-effect see Bornstein 1989). The literature is mute on the turning point where the positive reaction is expected to switch to a negative reaction. The challenge is that currently available measurements of frequency are not consistent in definition (see Table 1), and the existing studies are either at the very high or very low extremes of frequency; failing to explore the necessary range of the frequency variable to examine this hypothesis.

Finally, a discussion of ‘false alarms’- i.e., warning customers about an incorrect assessment of hazard, - has recently gained prominence in the light of new scientific findings. For example, a recent study has challenged the accepted wisdom that saturated fat is inherently correlated with heart disease; potentially exposing previous nutritional guidelines as ‘false alarms’ (Chowdhury et al. 2014). Since there are concerns that the increasing reliance on warning labels may have led to a false alarm effect whereby labels have become less trusted over time (Breznitz 2013), we carried out a post-hoc analysis using “year of study” as a moderator. The results do not support a false alarm or saturation effect over the forty-year time span of our meta-analysis, suggesting that the effectiveness of warning labels has remained constant over time ($\beta = -.0052$, $SE = .0032$; $t\text{-value} = -1.61$, $p > .10$).

Guidelines for label design

The current meta-analysis also provides a thorough investigation of the label characteristics that affect warning label effectiveness. Argo and Main (2004) found that conspicuousness of a label increases its effectiveness. Our results support their finding, but our larger pool of effect sizes enables us to break down this category into sub-dimensions and emphasize the important role of each moderator. Noticeably, content and location of the label have the strongest effect sizes, whereas conspicuous images showed a marginal effect on label effectiveness. The marginal effect size reflects the large heterogeneity across studies of pictorial warnings and insufficient evidence for or against their use; in line with a recent systematic review on the effects of pictorial warnings (Monarrez-Espino et al. 2014).

Our results distinguish between the more effective pictorial warnings coupled with fear appeal (as seen on cigarette packages) and those displaying only conspicuous pictures. It is consistent with a central/peripheral perspective to persuasion (Cacioppo and Petty 1982). Accordingly, the central route to persuasion is more cognitively-intense and step-by-step, while affective cues, and particularly fear, may have a complementary effect on compliance via a peripheral route. The peripheral route is less cognitively demanding-eschewing attention, comprehension, recall, and judgment- and targets behavioral compliance directly. From a public policy perspective, however, a fear appeal is not a guarantee of success since, besides their limited effect, such pictorials have not yet been tested on any product category other than cigarettes.

Methodological concerns for academia and public policy

From a methodological standpoint, our analyses offer guidelines for measuring public policy effectiveness including pre-test evaluations and post-intervention measurements. A public policy decision should generally follow the SMART criteria which stand for Specific, Measureable, Achievable, Results-focused, and Time-bound (Doran 1981; Shahin and Mahbod 2007). Measuring the success of a campaign is important. To be measurable, one has to have appropriate expectations that are realistic; whether in evaluating the efficacy of a campaign or to pre-test an upcoming intervention. Our results show that if policy makers are using surveys, the effect size should naturally be smaller than when they run an experiment; because experiments have a better control over the variables in question and the external noise.

Selecting research design sets the expectation for the effect size magnitude level that is going to be obtained. Policy makers are recommended to correct and adjust their interpretations of research results as a function of the methodology used. For instance, when assessing the effectiveness of a new policy, the comparison with past experimental studies could be less favorable than with survey-based studies simply because of their methodology. In this case, it may unwittingly disappoint or mislead policy makers into thinking that the policy is not successful enough or compel authorities to stop an intervention that actually works.

We also find support to claim that the difference in effect size magnitude between research designs is not due to publication bias. We ran three different tests for publication bias. Our tests did not reveal a major publication bias in the warning labels literature. Our tests in their present form make an important inference about the current state of the literature with the following policy-making implications: If published studies were a biased sample of all studies that had been conducted, then the validity of any public policy inference or conclusion drawn from scientific publications would have been threatened.

For public policy purposes we invite policy makers to design a combination of methods (including lab experiments, field experiments, surveys, etc.) in a multi-phase integrative research to minimize the probability of skewed interpretation of scientific reports. This of course can make public policy research more expensive to design and more time-consuming to implement; but we expect this approach to increase the validity of the conclusions and effectiveness of legislations. The second best way to increase validity is to base public policy decisions on structurally-integrative works such as meta-analyses.

1.6 Limitations and Future Research

This meta-analysis includes a wide range of studies across the literature. However, some studies may have not been included due to shortcomings in data or design. For example, a prospective longitudinal cohort survey in four countries by Partos et al. 2013 was excluded because of their definition of dependent variable and their sample: they looked at ex-smokers (non-users) who relapsed (fell back to suffering after a period of improvement rather than moderating or ceasing it). In another instance, a PhD thesis by Munoz and its subsequent paper (i.e., Munoz et al. 2010) were excluded from the database because coders were unable to ascertain if the focal message was in fact a warning label or was simply evoked in the form of a statement/question within the questionnaire.

The theory-testing capacity of a meta-analysis is directly affected by the research design of its original studies (Miller and Pollock 1994). According to Sharpe (1997) one of the three threats to the validity of meta-analysis work is inclusion of poor quality studies. In

our work we tried to eliminate this threat by carefully selecting which studies to include. We also took into account potential publication biases by including appropriate tests.

We could not collect enough eligible studies on physical cost of compliance to be able to include it as a moderator. We understand that it is a particularly interesting descriptor of behavioral compliance. Understanding the nature of such costs, combined with the information cost existing in the information processing model, can further shed light on the underlying differences between safe-use and moderation/cessation types of warnings. We hope that future endeavours will delve into this parameter in more detail. For a discussion on the importance of cost of compliance in warning effectiveness see Stewart and Martin (1994, p. 12).

Frequency of exposure is another important topic of discussion in warning labels that requires more attention in primary studies. While our observations could be interpreted as a sign favoring over-exposure and wear-out, it is important to underline that frequency was operationalized very heterogeneously in the literature (e.g., substance use, alcohol use, number of cigarettes per day, lifetime cigarette use, smoking habits, familiarity, frequency of noticing a warning, and product knowledge). Further research with a more stable set of measures of exposure frequency is warranted. Researchers may also detect the mechanisms in use by contrasting high and low frequencies of exposure.

Although our meta-analysis offers a comprehensive take on the drivers of the effectiveness of warning labels to date, it also highlights promising research avenues for the future. Promotional pre-activation seems to be an important moderator in terms of warning effectiveness; explaining about a quarter of the variance. However, since cost effectiveness is an important attribute of warning labels, the benefits afforded by promotional pre-activation should be evaluated in future studies in the light of its extra cost.

The research on warning labels is highly product specific. In the current meta-analysis, most labels of moderation/cessation type were associated with tobacco and alcohol. A confound of product type with message type is thus likely. However, post-hoc analyses reveal that labels used for tobacco and alcohol display similar patterns of effect sizes

across the effectiveness dimensions. We ran separate analyses on each step of the decision making model. For the first four effectiveness dimensions (e.g. Attention, Comprehension, Recall, and Judgment) the effect sizes did not differ between labels associated to tobacco, alcohol or other product categories. However, labels for tobacco and alcohol were consistently less effective in terms of behavior when compared to other product categories; $t(\text{cig}) = 2.93$, and $t(\text{alcohol}) = 2.94$, with $p\text{-values} < .01$ respectively. Moreover, we did not observe any significant difference between tobacco and alcohol in the effect size of behavior measures ($t\text{-value} = .149$, $p\text{-value} = .251$). This does not exclude the possibility of a confounding effect, but it suggests that labels for tobacco and alcohol product share the same basic properties; namely that labels for these two product categories are used with an objective of moderation or cessation. Future studies should compare the effect of moderation/cessation on behavior modification within a single product category. This would help to exclude the prospect of a confounding effect of product category.

What is the legitimacy of the safe-use vs. moderation/cessation distinction? Could there be other arguments to explain the situation? Could it be due to high or low levels of customer involvement with product purchase decision that we observe the distinction between compliance of the warning labels? Let's compare a high involvement and a low involvement product. Since a regular customer shows higher involvement buying an alcoholic product (spends more time making a decision) than for a pack of cigarette (simpler decision hierarchy), we pick these two product types. Both product types share the prohibitive moderation/cessation objective, which means they must be similar unless the key difference comes from involvement. We compare them on each step from attention to behavior. We find similar results for alcohol and cigarettes ($p\text{-value} > .05$). So we are not allowed to rule that the difference comes from involvement of the customer. We also did not find any prior study in the literature investigating the level of governmental intervention (how much force was required or exerted by the government to apply a warning on a product). Thus, the meta-analysis cannot make any inferences on this parameter. Most of the warning labels today are to some extent government-enforced. Both safe-use and moderation/cessation warning types have varying levels of

government intervention that nullifies the hypothesis of governmental intervention effect.

While this manuscript underlines the difference between safe-use and moderation/cessation warnings, one may wonder whether there is a difference between moderation and cessation? Is cessation essentially an extreme version of moderation where consumption is reduced to zero or does it show its own features and characteristics? In the context of our formulation, we have not distinguished them from one another, but can we consider a distinction that explains the two apart? Technically speaking, moderation and cessation warnings both adopt similar mechanisms to deliver their message to the customer. They both set an objective to reduce consumption versus safe-use warnings which do not prescribe reduction and essentially is not prohibitive. Both moderation and cessation have a prohibitive nature. Future research efforts can focus on the differences between moderation and cessation, and see if they can replicate similar effect size differences between the two types as seen between safe-use vs. moderation/cessation.

Our analysis on the difference between including a “no warning label” control group in lab experimental designs as opposed to only having treatment group comparisons (i.e., varying conditions with warning labels) did not reach significance level. We anticipated that a true control group would increase the strength of the effect sizes due to disentangling the impact of a label versus no label from manipulations of specific label features. However, the difference was not statistically significant (t -value=1.72, $p=.0877$). We invite other colleagues to follow up on this question.

Finally, future studies may also test and compare a curvilinear hypothesis with our proposed linear cascade of effects.

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Note: the references used in the meta-analysis are denoted with an asterisk ().*

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Chapter 2

The Effect of Country of Origin on the Relationship between Product Recalls and Firm Value

Abstract

The present paper investigates the financial impact of country of origin on firm value, during a product recall announcement. Investors, as well as consumers, make inferences about the country of origin during a product recall incident. Country of origin signals quality of production, contributes to brand equity, and depicts the ability of the firm to recover from the consequences of the negative incident in future. We find that that country of origin can significantly decrease the negative abnormal returns incurred by a firm in a product recall incident thorough signalling higher quality. We do not find support for a similar effect of the other two dimensions of country of origin.

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Keywords: country of origin, product recall, brand equity, event study, cognitive inference.

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2.1 Introduction

Deaths, injuries, and property damage from consumer product incidents cost more than \$1 trillion every year only in the United States³. To protect consumers, governmental agencies such as Consumer Product Safety Commission (CPSC) in the United States oversee and regulate product recalls. A product recall incident signals the stock market about future instability for the firm and leads to significant negative impact on the future value of the firm, as the firm accepts some degree of financial loss by collecting the defective products from market shelves (Freedman et al. 2012). Since a decrease in the

^{3 3} <http://www.cpsc.gov/en/About-CPSC/>

firm's stock price can directly affect the evaluation of management team's performance, managers need to make timely and appropriate decisions should a product recall happen.

With the globalization of trade: (1) product recalls have become increasingly important both for consumers and companies (Pennings et al. 2002), (2) industries are faced with a proliferation of products with multi-country affiliations (Han and Terpstra 1988), and (3) media attention and visibility to the public have also raised quality and transparency demands by consumers as well as closer scrutiny by manufacturers and policy makers (Dawar and Pillutla 2000). These trends lead to the expectation that more product recall incidents will occur in the future with multi-country affiliations. In turn, these product recalls will produce greater negative consequences for firms (Ahluwalia et al. 2000; Chen et al. 2009).

In the literature, product recalls have been studied from a consumer and from an investor (e.g., stock market) perspective. The former has been studied to some extent in the marketing literature and focuses on 'communicating' appropriately about the crisis with consumers (e.g., Dawar 1998; Dawar and Pillutla 2000; Freedman et al. 2012; Korkofingas and Ang 2011; Kübler and Albers 2012; Liu and Shankar 2015; Rea et al. 2014; Rhee and Haunschild 2006; Van Heerde et al. 2007), while the latter has gained prominence mostly from an economics and finance stance and deals with the economic and financial wellbeing of the firm during the incident and in its aftermath (Davidson and Worrell 1992; Hoffer et al. 1988; Jarrell and Peltzman 1985; Thomsen and McKenzie 2001; Zhao et al. 2013).

Consumers make inferences about country of origin of the recalled products during a product recall incident. For instance, in a major recall event in 2007 that affected toy industry in the United States, the risks were associated with the toys which were mostly manufactured in China. Consumers took the recall announcements as information about the safety of an industry-wide practice of manufacturing in China (Freedman et al. 2012) which led to a 33% decrease in toy purchase intentions [in general], and 45% decrease in purchase of toys manufactured in China (Harris Interactive 2007). Such results are relevant for cases like the toy industry where licensed products account for

approximately one-quarter of production, and manufacturing in China is a common practice (Clark 2007).

The present paper hypothesises that the stock market, too, will make inferences from signalling country of origin of the recalled product. It investigates the financial impact of country of origin on firm value, during a product recall announcement. Country of origin signals quality of production (Freedman et al. 2012), contributes to brand equity (Mohd Yasin et al. 2007), and depicts the ability of the firm to recover from the consequences of the negative incident in future (Aaker and Jacobson 1994). The literature finds three types of inferences that comprise the dimensions of the country of origin construct: cognitive, affective, and normative (Obermiller and Spangenberg 1989; Verlegh and Steenkamp 1999). *Cognitive* dimension consists of extrinsic signals of product attributes that work as an informational stimulus to infer beliefs regarding product attributes such as quality (Bilkey & Nes 1982; Li and Wyer 1994; Steenkamp 1989 and 1990). *Affective* dimension associates a product to a national identity, resulting in a strong emotional and symbolic attachment (Fournier 1998). *Normative* dimension associates consumers' preference to buy domestic with their preference to show a morally appropriate support for the domestic economy (Baughn and Yaprak 1993; Peterson and Jolibert 1995; Shimp & Sharma 1987).

We test our theoretical predictions with data from product recall announcements by CPSC in a 40-year period between 1973 and 2013. Our key finding is that country of origin significantly decreases the negative abnormal returns incurred by a firm during a product recall, absorbing that impact in a *buffer effect*. It can be argued that higher quality perceptions signaled by country of origin contribute to the firm's higher estimated brand equity (Mohd Yasin et al. 2007), which in turn works as a buffer during the product recall incident, and delays and decreases the backlash from the market (Brady and Roehm 2007; Rea et al. 2014). The effect of country of origin on the stock market in the other two dimensions (i.e., affective and normative) is insignificant.

The rest of the paper is structured as follows. We will first review the literature of product recalls. After that, we explore three dimensions of country of origin effect (e.g.,

cognitive, affective, and normative) and build hypotheses on the effect of country of origin. In the methods section, we explain the mechanics of the study, and in the results and discussion sections, we will discuss our findings and their implications. Lastly, we will suggest avenues for further research.

2.2 Literature Review and Hypothesis Building

There are many examples that illustrate the impact of product recall incidents on firm value such as the great fall in market value of Coca-Cola after it was forced to withdraw 30 million cans and bottles in northern Europe in 1999, Toyota's auto recall in 2007, Intel's flawed Pentium chip recall in 1994, Johnson & Johnson's cyanide-laced Tylenol crisis in 1982, and the benzene contamination of Perrier's bottled water in 1990. The most helpful tool to study such events in a financial context is an event study method. Using financial market data, an event study measures the impact of a specific event on the value of a firm. The usefulness of such a study comes from the fact that, given rationality in the marketplace, the effects of an event will be reflected immediately in security prices (Mackinlay 1997).

Previous event studies on product recalls usually report a negative effect on firm value in various industries, markets, and contexts. Product recalls can significantly influence a firm's carefully developed brand equity, spoil the perceptions of quality of their products, destroy investor confidence in the firm, and lead to revenue loss and decline in firm's market value. Literature also suggests that the firms suffer larger losses in stock price than the direct cost of collecting the faulty products off the shelves. The larger loss is often attributed to indirect costs of a recall incident such as damage to brand equity (Davidson and Worrell 1992; Dawar and Pillutla 2000; Pruitt and Peterson 1986). Some articles suggest that there are contingencies such as firm's reaction strategy (active vs. passive) and depth of remedy action taken by the firm (e.g. repair, exchange, refund) that differentiate among the firms in terms of abnormal return. Such contingencies are worth attention by the management. Table 1 summarizes the literature on product recalls event studies.

Table 1: Event studies on product recall incidents

Author (year)	Industry	AR (%)	Main findings
Jarrell and Peltzman (1985)	auto	-1.60	Spillover effect
Davidson and Worrell (1992)	beyond the automobile industry	-.0068	impact of two different remedy strategies (refund vs. repair)
Thomsen and McKenzie (2001)	meat and poultry	-.010	--
Chen et al. (2009)	toys, household products, etc.	-.69	impact of two different response strategies (proactive vs. passive)
Zhao et al. (2013)	Chinese industries	-.65	greater financial loss in China vs. Western world; Chinese food industry vs. automobile industry.

In one of the early attempts, Jarrell and Peltzman (1985) investigated the impact of product recall incidents on the wealth of shareholders in drug and auto industries. They find that the shareholder losses during product recalls are substantially greater than the action costs of the recall (i.e., costs of destroying or repairing defective items). In fact, they find that the losses may affect the future financial wellbeing of the firm by spilling over to the firm's goodwill reputation and may even spill over to the performance of other competitors in the industry.

Davidson and Worrell (1992) extended the literature beyond the automobile industry and observed that the negative abnormal returns following the recall announcements are significantly higher when products are replaced (or refunded) rather than when the products are repaired. Thomsen and McKenzie's (2001) event study on food safety control analyzed meat and poultry recalls from 1982 to 1998 to find significant shareholder losses when publicly traded food companies are involved in recall incidents.

Chen et al. (2009) compared a firm's proactive vs. passive strategy to announce a product recall. They found that from an investor's perspective a proactive strategy (one where firm announces a recall before being legally obliged to) can affect firm value *more negatively* than a passive strategy (announcing a recall only after government intervention) due to information asymmetry. More recently, Zhao et al. (2013) extended

Chen's findings from Western context to Eastern context (i.e., China) and found consistent results about product recalls in China.

In sum, prior research is an assessment of what should a firm expect with a product recall or what to do when the product recall has unfolded. We aim to look at the effect of prior managerial decisions (i.e., choice of country of manufacture) on the future negative value associated to a product recall.

Country of origin and product recall

A product recall incident generally sends negative signals from the firm to the investors which results in a drop in firm value. The negative signal can be attributed to either (1) lack of product quality or (2) firm's mismanagement at the strategy level or control level. While the latter is usually associated with the firm itself, the former can be attributed to both the firm and/or the manufacturing environment of the firm, if a separate entity.

Country of origin effect is synonymous with the ubiquitous "made-in" label that signifies where the product was built in. In recall announcements, mentions of made-in come in the form of country of manufacture; which functions as a proxy for country of origin effects, if mentioned in the announcement (see Appendix 1 for a sample announcement). The country of origin construct has been studied in a large body of research. We follow the country of origin framework developed by Obermiller and Spangenberg (1989) suggesting that the effects of country of origin fall under three dimensions: cognitive, affective, and normative. The three dimensions shape the overall country of origin effect (Isen 1984). Verlegh and Steenkamp (1999) as well as others have used a similar classification (for a summary of the literature refer to the meta-analysis by Verlegh and Steenkamp (1999) which reviews previous country-of-origin research).

Cognitive cues: Country of origin is regarded as an extrinsic signal of product attributes and works as an informational stimulus about a product to infer beliefs regarding

product attributes such as quality (Bilkey & Nes 1982; Li and Wyer 1994; Steenkamp 1989 and 1990).

Affective cues: In addition to its role as a quality cue, country of origin associates a product with status, authenticity and exoticness of a national identity, resulting in a strong emotional attachment (Fournier 1998). Lefkoff-Hagius and Mason (1993) suggest that country of origin is an important source of brand equity because such associations are based upon symbolic and emotional meaning that is attached to the name and imagery of a country (Li and Monroe 1992; Batra et al. 1999).

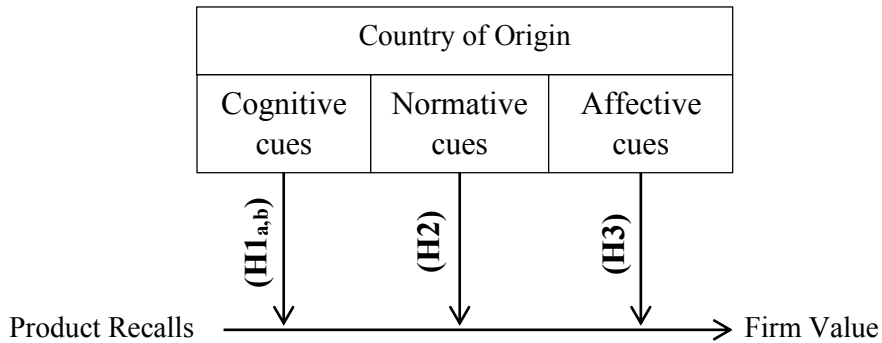
Normative cues: Traditionally, consumers have a preference to buy domestic. Consumers purchase domestic products as a morally appropriate action because it supports the domestic economy (Baughn and Yaprak 1993; Ozsomer and Cavusgil 1991; Peterson and Jolibert 1995; Shimp & Sharma 1987; Verlegh and Steenkamp 1999). On a broader view, consumers may reward friendly countries through the purchase of their products, or punish hostile ones by boycotting them. For example, the purchase of Japanese products is perceived by some Chinese consumers to be equivalent to treason (Klein et al. 2002). Consumers tend to follow this norm more strictly in countries where governments and labor unions promote domestic buying (e.g., the US, Canada and the UK).

Normative preference for country of origin is attributed to consumers' levels of ethnocentrism (Baughn and Yaprak 1993; Shimp and Sharma 1987; Verlegh and Steenkamp 1999). Consumer ethnocentrism is positively related to consumer preference for domestic products, and negatively to preference for foreign products (Shimp & Sharma 1987, p. 280).

We expect that the effect of country of origin is shaped by cognitive, affective and normative processes. Cognitive cues provide substance for information processing. From an investor's perspective, the market should have a substantial reaction to any information signalling product quality because that information will be used to reformulate expected future earnings (Aaker and Jacobson 1994). Affective cues provide motivation for information processing, and may initiate, terminate or enhance

the processing of information, or influence retrieval and evaluation of the cognitive cues (Askegaard and Ger 1998; Ger 1991; Isen 1984). Normative cues involve both cognitive and affective responses. For example, boycotting products from a country requires elaborate cognitive processing, as well as evoked emotions like fear and anger (Osterhus 1997; Klein et al. 1998). Thus, it is appropriate to visit the effect of country of manufacture through all three dimensions. Figure 1 presents a schematic depiction of the moderation:

Figure 1: The effect of country of origin on the relationship between product recall and firm value



H1a: Product recall announcements have a *weaker* negative impact on stock returns of the firm, when the product comes from a country with *higher* perceived manufacturing quality than a lower one.

Interestingly, the marketing literature is not univocal on the relationship between brand equity and firm value. While strong inertial characteristics of a good reputation may suggest a buffer effect that delays and decreases the intensity of the negative backlash, some may argue that a good reputation could alternatively set the expectations high, giving room for violation of those expectations during a recall incident and consequently the firm could suffer even greater market penalty to have disappointed the expectations. This is called *high fall* effect. From a customer perspective in the U.S. automobile industry, reputation is seen an organizational liability since highly regarded automotive firms suffered greater market penalties as a result of their product recalls (Rhee and Haunschild 2006). Gregoire, Tripp, and Legoux (2009) explain this “love-becomes-hate” reaction by showing that the firm’s strong-relationship customers have the longest unfavorable reactions and their revenge decreases more slowly than that of weak-relationship customers. We will test both directions for the stock market reaction. Thus:

H1b: Product recall announcements have a *stronger* negative impact on stock returns of the firm, when the product comes from a country with *higher* perceived manufacturing quality than a lower one.

While ethnocentric tendencies in customers can play a role in their subjective assessments to buy or boycott a foreign-made product (normative dimension), the stock market is expected to make more objective decisions. To estimate the normative dimension of country of origin, we compared ethnocentric tendencies over US-made products (home) vs. foreign-made products. We aggregated cultural distance between US and the country of origin as a proxy of us vs. them (Kogut and Singh 1988). We hypothesize that the more culturally distant the country of the manufacturing firm from the United States (home), the more negatively the stock market reacts to the product recall:

H2: Product recall announcements have a *weaker* negative impact on stock returns of the firm, when the product comes from a country with *larger* cultural distance than a shorter one.

For affective dimension of country of origin, we compare the general popularity of the country brands. We use the well-maintained annual Country Brand Index list (Futurebrand 2014) as a proxy to compare manufacturing countries. Thus:

H3: Product recall announcements have a *weaker* negative impact on stock returns of the firm, when the product comes from a country with *higher* country brand image than a lower one.

2.3 Method

Event study analysis

To investigate the impact of product recall incidents on a firm's market value, we adopt the event study methodology. Event study methodology is an analytical technique originally developed in finance and accounting (Binder 1998; Fama et al. 1969; Srinivasan and Hanssens 2009). This methodology is now used in fields such as business research, information systems, and marketing (Konchitchki and O'Leary 2011; McWilliams and Siegel 1997).

Event studies assume that the market operates in perfect information conditions where the stock price integrates all public information available to rational investors (Fama 1970; Srinivasan and Bharadwaj 2004). Under such "efficient market hypothesis" (Fama 1970), any unexpected event brings new information to the market and changes the stock price (Srinivasan and Bharadwaj 2004). An event study isolates this price reaction from other confounding events at a given time and compares the actual stock price to the estimated stock price if the event hadn't happened. The difference is attributed to the deviation of the firm stocks from the returns of the market portfolio due to that event of interest (MacKinlay 1997).

Event study methodology is an appropriate technique for the present investigation because (1) we study product recalls from a market perspective rather than a consumer perspective, and (2) product recalls are known to be unexpected important economic events as the announcements are. In fact, CPSC announcements carry precise and accurate information about each event that makes it possible to study direct and isolated effects of each incident. Information of a recall incident doesn't leak to the stock market prior to the announcement. The main steps of the methodology are detailed in the following sections.

Database and measures

The event of interest in the present investigation is a product recall incident announced through a CPSC press release. The date of the event of interest is the date of its announcement through the press release. In case of any confounding event(s) on the day of product recall, authors exclude that incident from the analysis. Confounding events are obtained via thorough search of business news archives and databases such as the *Wall Street Journal* and *Factiva*.

The dataset of recall incidents is obtained from CPSC. It is then compared with daily stock prices (obtained from CRSP stock price files for the period 1973 to 2013) to distinguish between public and private firms. As we are looking at stock price fluctuations as the indicator of change in firm value, data of incidents involving private firms, foreign companies not traded on U.S. stock exchanges, and firms taken over during the period of interest is excluded. Several further steps were undertaken to identify usable events and eliminate unusable ones:

- (1) Those events with potentially confounding events (e.g., dividend announcements, mergers, or litigations) were identified via thorough search efforts in WRDS databases and eliminated. (121 events)
- (2) Those events with potential leakage of information prior to press release were identified via searching for related news on safety issues in the Wall Street

Journal and Factiva databases, and were eliminated (Davidson and Worrell 1992). (3 events)

(3) Those product recalls with long term and chronic hazards (e.g., lead related concerns) that did not cause immediately visible incidents were located, and eliminated (Chen et al. 2009). (14 events)

(4) The remaining recall incidents were coded for information captured in the content of the recall announcements. Those events that remained with missing key information, such as country of manufacture, were eventually eliminated. (73 events)

Finally, the usable sample consisted of 211 unanticipated recall announcements for which we can compute the differential financial impact of product recall events from 1973 to 2013.

The CRSP database provides the necessary stock return data (covering the NYSE, AMEX, and NASDAQ stock exchanges) to calculate and compare stock price and other market-related indices for event study.

Event study model specification

The dependent variable, i.e. the abnormal return, is defined as “the actual ex-post return of the stock during the course of the event window minus the expected normal return during the same time frame if the event had not taken place” (Srinivasan and Bharadwaj 2004, p. 12). As a benchmark model for the expected normal stock return, this study uses the traditional Market Model, Fama-French three-factor, and Fama-French four-factor (with Momentum) model that augment the market model by adding market abnormalities (Carhart 1997; Fama and French 1996; Karniouchina et al. 2009). The length of the event window is short and includes the date of the event and the following day (Chen et al. 2009; MacKinlay 1997; Srinivasan and Bharadwaj 2004). The estimation window for the benchmark model consists of 250 days starting 46 days before the event date (Chen et al. 2009; Karniouchina et al. 2009). The normal and

abnormal returns are estimated to test the main effect of product recall announcement on firm value:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (1)$$

Where R_{it} is the normal return of stock i at time t , R_{mt} is the return for standard market portfolio at time t , and ε_{it} is the generalized autoregressive conditional heteroskedasticity (GARCH) error term. The model then estimates coefficients α and β . We use those coefficient estimations to calculate the abnormal return (AR) on the day of event ($t = 0$):

$$AR_{i0} = R_{i0} - \hat{\alpha}_i - \hat{\beta}_i R_{m0} \quad (2)$$

Where AR_{i0} is the abnormal return for stock i , R_{i0} is the estimated normal return of stock i and R_{m0} is the return for standard market portfolio. $\hat{\alpha}_i$ and $\hat{\beta}_i$ estimates of α_i and β_i . We use Standard and Poor's S&P500 index to estimate market portfolio.

We adopt Generalized Auto Regressive Conditional Heteroscedasticity (GARCH) model which allows longer memory for conditional variance to be time varying, which in turn allows volatility shocks to persist over time (Bollerslev 1986).

Cross-sectional regression model specification

To draw additional inferences for the event of interest and its characteristics, cross-sectional regressions are performed on the abnormal stock returns aggregated across time per security (MacKinlay 1997; Srinivasan and Bharadwaj 2004). The daily abnormal return in equation (2) is used as the dependent variable in the cross-sectional regression model (Agrawal and Kamakura 1995; Srinivasan and Bharadwaj 2004).

Country of origin is measured over its three dimensions. For the cognitive dimension, we estimate the quality index of the country of origin (Hallack and Schott 2011). Normative dimension is measured by the cultural distance between the country of origin and the US (Kogut and Singh 1988). Affective dimension was measured by the help of an internationally recognized ranking of country brands to capture the general affective

perceptions of a country name (Futurebrand 2014). We discuss the description of the scales for each dimension in the following sections.

The key to inferences on the effect of country of manufacture is to control for observed and unobserved confounding factors to put aside other alternative explanations. In our study, we look at various categories of control variables to make sure that we cover all related controls at the event, firm, industry, and market level.

Event level controls are obtained from the original CPSC recall announcements (see Table 2 for details) and include product category (SIC), volume and average price of the recalled products, level of potential hazard (coded as mild, moderate, and high), depth of remedy strategy adopted by the firm, etc. Mild hazards include examples such as collapse or break, electrocution or electric Shocks, bumps, cuts, scrapes, fractures, poisoning, Entrapment. Moderate hazards include laceration, fire & fire-related burn, burn (not fire-related), Internal Injury, Amputation. Severe hazards include choking, aspiration, suffocation, strangulation, drowning, carbon monoxide (CO). Remedy strategies are coded according to the extent that the firm underwent compensation or hazard removal, such as offering a repair, providing warning labels and instruction sheets, exchange of the product, reimbursement of the product, and compensations beyond reimbursement.

Firm level controls are collected from *Compustat* database. We follow the existing literature as to what characteristics of a firm should be accounted for (e.g., Chen et al. 2009), namely: Size of the firm (measured by total sales), total firm liabilities, and book-to-market value (see Table 2).

In order to address variability in industry classification, we use SIC standard classification of industry groups as a proxy. The Standard Industrial Classification (SIC) is a system for classifying industries in the United States by a four-digit code, since 1937. It is currently used by government departments and agencies, such as the U.S. Securities and Exchange Commission (SEC) to classify industry areas.

At the market level, we control for general market conditions by adding a year fixed effect, derived from the year report in the original CPSC recall announcements. This control makes sure that the observed variance is not associated with general market fluctuations when the recall event happened.

Angrist and Pischke (2008) suggest that a strategy to control for unobserved but fixed omitted variables account is to use data with a time or cohort dimension. The key to fixed effects estimation is the assumption that the unobserved confounds appear without a time subscript in a linear model. We adopt this strategy for controls at industry- and market-level.

Table 2: List of variables in the analysis

Variable	Source	Operationalization
Country of manufacture	CPSC	The country in which the product is manufactured
Country quality index	Hallak and Schott (2011)	Quality index
Cultural distance	Kogut and Singh (1988)	Distance between the US and country of manufacture
Country brand	Futurebrand (2014)	General popularity of a country brand
Volume	CPSC	The number of recalled product units sold
Price	CPSC	The (average) retail price of the recalled product
Level of potential hazard	CPSC	The level of product hazard risk (high, moderate, low)
Remedy strategy	CPSC	The depth of reimbursement action (denial, warning label, free repair, product exchange, partial and total refund, super effort)
Proactive or passive	CPSC	Whether the recall strategy is proactive or not
Firm size	Compustat	Measured by the sales revenue
Total firm liabilities	Compustat	The level of current liability of the recalling firm
Book value	Compustat	Book Value per Share
Market value	Compustat	The price at which firm's stocks are trading and

The fixed effect model in equation (3) is used to test the impact of the country of manufacture on the firm value:

$$AR_{it} = \alpha_{it} + \beta_{jt} + \gamma_j + \lambda_t + \rho QUALITY_{kt} + \mu COUNTRYB_{kt} + \mu' CDISTANCE_k + \varepsilon_{it} \quad (3)$$

Where,

$$\varepsilon_{it} \equiv AR_{0it} - E[AR_{0it} | QUALITY_{kt}, COUNTRYB_{kt}, CDISTANCE_k, t]$$

And,

$$\alpha_{it} \equiv \alpha + \omega PROACT_i + \theta DEPTH_i + \sigma SEVERITY_i + \varphi COST_i$$

$$\beta_{jt} \equiv \beta + \kappa SALES_{jt} + \nu LIABILITY_{jt} + \chi BOOKVALUE_{jt} + \psi MARKETVALUE_{jt}$$

Where AR_{it} is the dependant variable, α_{it} includes event-level controls, β_{jt} includes the firm-level controls, γ_j is the fixed effect of industry, λ_t is the fixed effect of time, $QUALITY_{kt}$ is a variable containing the quality index of the Country of Manufacturing k at time t , $CDISTANCE_k$ is a variable containing the cultural distance of the country of manufacturing k from the U.S., $COUNTRYB_{kt}$ is a variable containing the country brand index of the country of manufacturing k at time t . $PROACT_i$ is a dummy variable denoting the strategy of the firm, $DEPTH_i$ is the depth of remedy provided to customers, $SEVERITY_i$ denotes the severity of the hazard for which product recall is announced, $COST_i$ is the potential cost of taking a remedy action, $SALES_{jt}$ denotes the size of the firm according to total sales numbers, $LIABILITY_{jt}$ denotes relative strength of the firm based on its total liabilities, $BOOKVALUE_{jt}$ and $MARKETVALUE_{jt}$ are used to calculate book-to-market value of the firm j , with $[\rho, \mu, \mu', \omega, \theta, \sigma, \varphi, \kappa, \nu, \chi, \psi]$ as their coefficients, respectively.

Robustness tests

In order to detect outliers in the dataset and maintain stable results in their presence, we adopt robust regression methods. The most commonly used methods are Huber M estimation, high breakdown value estimation, and combinations of these two methods. Robust regression methods limit the influence of outliers. Our pre-tests show that there

are only three bad leverage points in our dataset, so the M method appears appropriate for this purpose (Huber 1973).

Given the nested nature of the data in a recall announcement and existence of different levels of control variables, it is a good practice to run the model using hierarchical methods such as HLM. In terms of robust HLM model, this study computes the random term with restricted maximum likelihood (ML), which allows for a comparison of the usual standard errors and the robust standard errors. A deviance test demonstrates that giving up some parsimony by adopting a 2-level structure is warranted since the model estimating the overall effect size with the 2-level specification fits the data better than a fixed effect model ($\Delta\chi^2 = 6.9$, $df = 1$, $p < .01$).

Estimating cognitive dimension: Cross-country differences of quality

The cognitive dimension relates to the manufacturing quality of a country, which in turn is a function of the level of a country's overall economic competitiveness and economic attractiveness, as it reflects their ability to manufacture with a certain level of skill and technology (Verlegh and Steenkamp 1999, p. 532). In order to estimate the quality level of a country over time span of our research, we adopt Hallak and Schott's (2011) index of country manufacturing quality that turns export prices of a country and information contained in trade balances into a quality index.

Hallak and Schott (2011) published their estimations of the evolution of manufacturing quality for top world exporters from 1989 to 2003. To have a functional index for our study, we re-calculated the quality index for each country and for every given year with a product recall, using the calculations from Hallak and Schott's technical appendix. We took this precautionary step because Hallak and Schott's published index took intervals of every four years in reporting cross-country quality indexes. Moreover, we needed to attain reliable quality indices for recall announcements outside the time span of their reported index.

In case a country was not included in Hallak and Schott's (2011) quality index table (e.g., Bangladesh), we used the index of the country with the closest per capita GDP

because quality and per capita GDP are strongly correlated (Hallak and Schott 2011). GDP per capita data are extracted from World Bank national accounts data, and OECD National Accounts data files⁴. Overall, three countries were affected by this issue.

Estimating normative dimension: Cross-country cultural distance

We calculate cultural distance based on Kogut and Singh's (1988) formulation of Hofstede's dimensions of culture (i.e., power distance, collectivism/individualism, uncertainty avoidance, and masculinity/femininity). Cultural distance functions as a proxy to detect if customer ethnocentrism tendencies are triggered and tests normative dimension of country of origin effect. In order to obtain cultural distance of every manufacturing country with the United States, we calculate the difference for all six dimensions and correct that for differences in the variances of each dimension:

$$CDISTANCE_j = \sum_{i=1}^4 \left\{ (I_{ij} - I_{iu})^2 / V_{ij} \right\} / 4 \quad (4)$$

Where $CDISTANCE_j$ is the cultural distance of the j th country and the United States (indicated by u), I_{ij} is the i th cultural dimension of the j th country, and V_{ij} is the variance of the i th dimension.

Estimating affective dimension: Country brand index

To obtain a measuring tool for the affective and symbolic value of a country name we coded each country according to whether it has made it to the top 10 list in a given year or not. Country brand index is estimated using one of the world's largest and longest standing global studies of country brand perception, created by FutureBrand Inc. (2014) through a blend of quantitative, qualitative and social/online research. The country brand index (COUNTRYB) shows how far a country is seen to address broader emotional and societal needs and wants – from fostering trust to driving innovation. COUNTRYB focuses on origin and provenance of products, and the effect these factors have on consumers' desire to purchase goods.

⁴ <http://data.worldbank.org/indicator/NY.GDP.PCAP.CD>

2.4 Results

Results of event study

Table 3 presents the event study results. We use multiple test statistics to examine abnormal returns for three types of estimation models namely Market Model, Fama French, and Fama French with Momentum. While most of the event studies on product recalls use the [0,+2] window, we also found the [0,+7] window significant, but the analysis is based on the [0, +2] window. We examined Patell's (1976) test statistic, which makes the event study analysis robust to potential bias caused by stocks with large standard deviations in returns. According to Table 3, product recall incidents are associated with an average decrease of -.63% in firm stock prices over the next two days after the announcement (Market model estimates). The abnormal return is consistently significant in the Patell Z test, generalized sign test, and direction test. The cross-sectional t-test which is robust to year and industry clustering is also significant (t-value = -1.892, p-value < .05).

Table 3: Abnormal returns for window [0,+2]

	N	Mean CAR	Precision Weighted CAAR	Positive: Negative	Patell Z	CSectErr t	Gen. Sign Z
Market Model	211	-0.63%	-0.54%	88:123*	-2.097*	-1.892*	-1.814*
Fama French	211	-0.69%	-	89:122*	-	-2.038*	-1.695*
Fama French (with Momentum)	211	-0.69%	-	88:123*	-	-2.047*	-1.885*

* p<.05

To confirm the appropriateness of the window and to ensure that no information was leaked prior to the announcements, we examined market behavior in the period of two days prior to the event. Table 4 presents the abnormal returns. The alternative event window containing two days preceding the announcement [-2,0] was not significant. This provides empirical evidence in favor of no leakage of information.

Table 4: Testing for information leaks during window [-2,0]

	N	Mean CAR	Precision Weighted CAAR	Positive: Negative	Patell Z	CSEctErr t	Gen. Sign Z
Market Model	211	-0.20%	-0.29%	93:118	-1.132	-0.509	-1.125
Fama French	211	-0.26%	-	92:119 ^s	-	-0.664	-1.282 ^s
Fama French (with Momentum)	211	-0.22%	-	90:121 ^s	-	-0.554	-1.609 ^s

^s p<.10***Correlation Matrix***

Table 5 depicts the correlation matrix for the regression parameters. A high correlation is observed between country brand and cultural distance ($r=.97$, $VIF>15$) which may signal a high correlation between the affective and the normative proxies. Thus, we do not include COUNTRYB and CDISTANCE in the regression model at the same time. To avoid collinearity issues, separate models tested for country brand and cultural distance. Table 3 depicts the results accordingly.

Table 5: Correlation table

	Mean	SE	AR	Quality	Cdistance	CountryB	Depth	Proactive	Severity	Cost	Sales	Liability	Book Value
Abnormal returns	-0.01	0.05	1										
Quality	-0.24	0.28	0.05	1									
Cultural distance	2.43	1.78	-0.02	-0.66*	1								
Country brand	0.27	0.44	0.01	0.66*	-0.97*	1							
Depth of action	2.26	0.96	-0.06	-0.26*	0.36*	-0.31*	1						
Proactive	0.35	0.48	-0.04	0.01	0.08	-0.06	0.14*	1					
Severity of hazard	0.92	0.69	-0.01	-0.05	0.17*	-0.12 ^s	0.20*	0.07	1				
Action cost	14.07	2.45	0.03	0.17*	-0.31*	0.26*	-0.50*	-0.25*	-0.27*	1			

Sales	1980	3905	0.03	-0.10	0.17*	-0.17*	0.04	-0.15*	-0.02	0.11	1		
Liability	5703	20783	0.04	-0.07	0.11	-0.15*	0.08	-0.08	-0.06	0.08	0.77	1	
Book value	14.89	50.89	0.01	0.13 ^s	-0.12	0.13 ^s	0.05	0.10	0.12 ^s	-0.04	-0.03	-0.02	1
Market value	8019	28882	0.09	-0.05	0.08	-0.14 ^s	0.02	-0.09	-0.07	0.12	0.71*	0.94*	-0.06

* p<.05

^s p<.10

Results of regression analysis

The market views product recall announcements as generally negative signals that bring about an average of -.63% negative stock returns (Table 3). In this section, we examine the effect of country of origin to complement the event study and to show that country of origin is a significant influencer of the abnormal returns. The typical approach in the event studies to examine the influence of a factor is to conduct cross-sectional regression of abnormal returns against a set of explanatory variables (MacKinlay 1997). Table 6 presents the complete results for the regression model.

Table 6: Cross-section regression results

	Quality (Q)	Cultural Distance (CD)	Country Brand (CB)	Q + CD	Q + CB
Intercept	.00034 (.052)	.0062 (.057)	-.029 (.048)	.0064 (.055)	.00028 (.052)
Quality	.067 (.020)*	---	---	.063 (.02)*	.069 (.021)*
Cultural distance	---	-.0058 (.003) ^s	---	-.0012 (.0029)	---
Country Brand	---	---	.016 (.011)	---	-.0019 (.011)
Depth of action	-.021 (.009)*	-.021 (.009)*	-.021 (.009)*	-.021 (.009)*	-.021 (.009)*
Proactive	-.0047 (.008)	-.002 (.007)	.0024 (.0076)	-.0045 (.0076)	-.0048 (.0074)
Severity of hazard	.0027 (.007)	.0026 (.007)	.0014 (.0068)	.0026 (.0072)	.0026 (.0073)
Action costs	-.0015 (.002)	-.002 (.0021)	.0018 (.0019)	-.0017 (.0021)	-.0015 (.0021)
Sales	.0034 (.004)	.0034 (.004)	.0034 (.004)	.0034 (.004)	.0034 (.004)
Liability	-.0038 (.004)	-.0038 (.004)	-.0038 (.004)	-.0038 (.004)	-.0038 (.004)

Book value	-.0011 (.008)	-.0011 (.008)	-.0011 (.008)	-.0011 (.008)	-.0011 (.008)
Market value	.0045 (.008)	.0045 (.008)	.0045 (.008)	.0045 (.008)	.0045 (.008)
Industry fixed effect	yes*	yes*	yes	yes*	yes*
Year fixed effect	yes*	yes*	yes	yes*	yes*

* p<.05

\$ p<.10

As depicted in Table 6, cognitive inferences of quality have a significant effect ($ES_{Quality} = .067(.020)$, $p<.05$) which maintain significance when coupled with cultural distance and with country brand in the regression model ($ES_{Quality+CD} = .063(.020)$; $ES_{Quality+CB} = .069(.021)$; $p<.05$). Cultural distance (normative dimension) and country brand (affective dimension) coefficients do not produce the desired statistical significance levels. A model including all three dimensions together is not useful as country brand and cultural distance are highly correlated ($r=.97$; $VIF>15$).

The coefficients in Table 6 are calculated under market model specifications. The results from the two other event study models (i.e., Fama-French and Fame-French with momentum) are in line with the reported market model results (see Appendix 2). Under all three estimation models, our results produce a significant and positive coefficient for the quality inferences of country of origin. This confirms H1a, rejecting H1b. Cultural distance coefficient and country brand coefficient did not meet significance levels, rejecting H2 and H3.

Analysis of Robustness

We performed numerous robustness checks to verify the validity of our findings. First, we specified the event study model using three different approaches (see Appendix 2). We augmented the basic Market Model with 3- and 4-factor Fama-French models. Fama and French (1993) not only consider the excess of return in relation to the market (market factor), but also they account for the difference between the returns of portfolios with large and small companies, and the difference between the returns of portfolios of high capitalized and low capitalized companies.

Second, to ensure robustness and to eliminate the impact of outliers in the regressed output, we ran our model with robust regression methods. The M robust method correctly estimates the regression coefficients for the underlying model which confirms stability of the results (see Appendix 3).

Third, due to the nested nature of our dataset and various levels of controls, we tested HLM methods. Results of robust HLM tests indicate even better statistical significance (all reported $p < .01$). The standard errors are highly comparable, confirming the primary regression results (see Appendix 3).

Finally, we also tested sandwich estimator which is a robust covariance matrix estimator. Sandwich estimator is popularly used with generalized estimating equations (see Appendix 3). It provides consistent estimates of the covariance matrix for parameter estimates even when a parametric model is not specified or fails to hold (Carroll et al. 1998).

2.5 Discussion

Studies over the last 40 years have found that country of origin is an essential extrinsic attribute to indicate quality (Usunier 2006; Josiassen and Harzing 2008), determine whether products are accepted or successful (Dichter 1962), and lead to different evaluation of otherwise identical products (Schooler and Wildt 1968). A brand's country of origin image influences various dimensions of brand equity (Mohd Yasin et al. 2007). In the case of bi-national products where the country of origin is different from the country of brand, country of origin is even found to have more salience and more powerful effect than brand name on consumer evaluation of the product (Han and Terpstra 1988). Country of origin has often been used as a strong and positive signal if it is mentioned about a product. This paper investigates the effect of mentioning country of origin in a more or less neutral if not a negative situation; i.e. product recalls.

Our results suggest that during a product recall incident, country of origin has a moderating impact on the abnormal returns of a firm. This impact is channeled through the cognitive dimension, i.e. Quality. Quality, in turn, is a function of the level of a

country's overall economic competitiveness and economic attractiveness (Verlegh and Steenkamp 1999, p. 532). While a product recall decreases the firm value on average by .63%, lower quality countries suffer more whereas higher quality countries suffer less. In fact, for every unit decrease in quality index of a country of origin, the negative abnormal returns (.63%) are compounded by an average of 6.7%. For instance, take Germany (Quality index = .69) versus the USA ($Q=0$) versus China ($Q = -.48$). As we move from Germany to the US and to China, quality steps down almost half a unit at every step. We expect that the stock market would evaluate a recalled product produced in China with about 6.7% more negatively compared to a German manufacturer; and 3.3% to 3.4% more negatively compared to a US manufacturer.

We confirm that country of origin has a *buffer* effect rather than a high fall effect on the stock market. Such buffer effect absorbs the negative backlash during the incident and in the aftermath and creates a *grace period* that provides enough time for the brand to develop their next step (Brady and Roehm 2007; Cleeren et al. 2008; Rea et al. 2014). We can argue that country of origin influences the firm's existing brand equity, which directly influences firm value during and after the product recall (Brady and Roehm 2007; Cleeren et al. 2008; Rea et al. 2014; Rhee and Haunschild 2006). For example, Cleeren, Dekimpe, and Helsen (2008) compared a strong brand (i.e., Kraft) with a weaker brand (i.e., Eta) following the 1996 salmonella-poisoning crisis. They found that stronger brand equity allows for a faster recovery in terms of market share and high equity brands are less likely to be immediately penalised in a product recall than brands with low equity. We find that country of origin has an impact on this buffer effect that is mainly cognitive.

The normative and affective dimensions root in consumer ethnocentrism and the symbolic value of a country brand. Overall, and despite the range of product categories and countries investigated, neither cultural distance nor country brand were found to explain a significant proportion of the variance in our model and did not stand the test of statistical significance. Logically, stock markets evaluate firm value based on the objective inferences (e.g., quality), and ethnocentric tendencies are not generally triggered in their process of decision making. While ethnocentric tendencies in

customers can play a role in their subjective assessments to buy or boycott a foreign-made product following a product recall (normative dimension), the stock market is expected to make more objective evaluations. Similarly, the affective impressions associated with the name of a country as a brand element do not play an important role in the evaluations by the stock market.

2.6 Managerial Implications

Country of origin has long been a topic of discussion in international business. The recent surge in product recalls of Chinese-made products has attracted substantial attention from government and academia. In 2005, over half of the product risk notifications in Europe were related to products manufactured in China (European Commission 2005). Statistics announced by the Consumer Product Safety Commission of the US (2007) show that almost 70% of all product recalls came from Chinese-manufactured products (Zhao 2013).

From a managerial perspective, companies are always evaluating where they should take their manufacturing arms to stay competitive. This practice is known as off-shoring (Grossman and Rossi-Hansberg 2006). Our research reveals one of the potential hidden costs of off-shoring. While off-shoring is cost-effective and competitive strategy in normal conditions, when crises happen it might cause a bigger problem. Companies need to be able to evaluate how bad the situation can get in terms of firm value, which depends on the country of manufacture because the name of a country may create inferences about the quality of the recalled product, and/or spillover to other products of the firm. Our results also reveal that such an impact is less likely to be an issue of cultural distance or ethnocentrism.

We currently observe a trend in many countries including the US for companies to bring their production facilities back home (i.e., on-shoring), perhaps such hidden costs of off-shoring would convince more businesses to reverse their off-shoring strategies of the past two decades.

2.7 Limitations and Future Research

It is important to note the shortcomings of this study including those incurred by the event study methodology and other methodological presumptions. The results of event studies hinge on the joint hypothesis that the cumulative abnormal returns over the event window are not significantly different from zero and that the model used to estimate the normal returns is the true one. Further, one has to be careful while defining the event window; any confounding events during that window could bias the estimated excess returns. While most of the event studies on product recalls use the $[0,+2]$ window, we found the $[0,+7]$ window also significant. Thus, it may be interesting to employ robust methodologies to analyze the relationship in question within that window.

As we are looking at stock price fluctuations as the indicator of change in firm value, data of incidents involving private firms, foreign companies not traded on U.S. stock exchanges, and firms taken over during the period of interest was excluded.

The impact of country of origin on abnormal returns is subject to contingent variations of industry classification and time. For example, for some product categories country of origin may work as a barrier; or it may have no influence whatsoever for other product categories. In short, the value of the country of origin appears to be variable depending on both the product category and time. We accounted for those variations in our study using fixed effect analysis, yet further research between product categories is warranted.

Quality index used in this study aggregates the data on a country level. Future studies may go further and break down the quality index to individual industries within those countries. Countries may have different industries with various sensitivity levels to product recall incidents as reported by Zhao (2013) in Chinese market. To this day, we are not aware of any available worldwide quality by industry index to be used to this end.

A high negative correlation between action cost and depth of remedy action looks interesting ($r=-.50$). It looks like the firms are inclined to take a stronger remedy action if the potential action costs are not high. In fact, as the potential costs increase, the depth

of action decreases which means firms are not willing to incur the high costs. Similarly, the probability of a firm's proactive strategy (i.e., recalling a product before any reports of incident or injury) decreases with increase in potential action costs. Severity of hazard, however, is a curious item. The significant negative correlation between severity of hazard and action costs of recall incident implies that the more severe the hazard is, the smaller potential action costs become.

We also found significant effect sizes for depth of remedy action in our regression model. Depth of action refers to the extent that the firm goes to address the fault in their product and compensate affected customers. We coded for seven levels of remedy action taken by the firms according to the CPSC dataset (i.e., denial, warning label, free repair, product exchange, partial and total refund, super effort). Our results suggest that higher levels of reimbursement positively influence the abnormal returns. We can argue that the magnitude of the cost incurred due to each remedy action enters the calculations of future firm value by the stock market and decreases the firm value even more. Yet, further research is warranted to disentangle underlying mechanisms.

Country of origin effect is synonymous with the ubiquitous "made-in" label. In the context of product recalls, some recall announcements report the made-in country information as part of the announcement. The objective of the research is to investigate to what extent, this mention can make a difference in the decision of the stock market. Thus, country of manufacture is adopted as a proxy for country of origin. Throughout the second chapter, we have consistently referred to this parameter as Country of Origin, unless discussing the items on the recall announcements.

Finally, an avenue for further research can consider investigating the long-term effects of country of origin on firm value using a long-term abnormal return analysis. In this research, the immediate window after the incident was probed and we didn't explore the effects after the hype and shock is settled. We expect that market would move on from the initial shock, learn from the information contained in the incident, and correct itself in terms of financial evaluation of the firm. We expect that this will be reflected in

longer-term sales of the brand after the product recall incident. This question can be tackled by addressing sales volatility consequent to a product recall.

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General Conclusion

This thesis outlines and discusses two of the most commonplace tools that regulate the markets and eliminate potential risks of consumption: Warning Labels and Product Recalls. ‘Warning labels’ allow maintaining certain potentially-hazardous products on the market shelves by informing customers of those hazards; and ‘product recalls’ ensure that proven hazardous products are removed from the markets and customers are compensated by the manufacturers if already purchased or consumed those products.

Customer protection in North America has roots in the late nineteenth and early twentieth century. Traditionally, the efforts have been to mobilize effective political coalitions that champion legislations to protect consumers’ health and safety. As we pace into the information age, consumer protection strategies are shifting focus from governmental interventions to higher consumer autonomy and building standards that provide international markets with self-regulating power to eliminate systemic market failures.

The thesis is aimed at delineating the factors and conditions that affect their effectiveness from a balanced view. The first essay (Chapter 1) looks at the research question from a customer/consumer point of view, while the second essay (Chapter 2) takes on the issues of customer protection from a firm’s perspective.

Chapter 1 introduces a new conceptual framework for studying warning labels. This framework models information processing as a sequential system of effectiveness dimensions according to the classic information processing model (McGuire 1976). Depicting a diminishing cascade of effects enables the model to offer an important insight into the difference between two types of warning labels, namely: moderation/cessation and safe-use. Our analysis finds higher compliance for safe-use warning type compared to its moderation/cessation counterpart. Moreover, this framework brings to consideration a new set of contextual moderators which pertain to social and contextual awareness of warning messages. Chapter 1 also presents comprehensive findings about label characteristics especially on the use of pictorials.

Finally, we discuss those methodological moderators that may skew results and affect their interpretation.

Chapter 2 delves into the recall announcements for faulty or hazardous products and theorizes on the financially important role of information disclosure (e.g., country of origin) during a negative event like product recalls. In this chapter, we test our theoretical predictions with data from product recall announcements by CPSC in a 40-year period between 1973 and 2013. Our key finding is that country of origin significantly decreases the negative abnormal returns incurred by a firm during a product recall, absorbing that impact in a ‘buffer effect’. It can be argued that higher quality perceptions signaled by country of origin contribute to the firm’s higher estimated brand equity (Mohd Yasin et al. 2007), which in turn works as a buffer during the product recall incident, and delays and decreases the backlash from the market (Brady and Roehm 2007; Rea et al. 2014). The effect of country of origin on the stock market in the other two dimensions (i.e., affective and normative) is insignificant.

In both essays, the reliability of the coding was an important concern. The coding was carried out by the authors. The datasets were sampled in a number of instances and separately coded by independent coders in order to assess the reliability of the coding process. The output of the independent coders was then compared with the coding of the authors, to make sure that coding process are reliable. However, a reliability index was not calculated because the data from independent coders was not inclusive enough.

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Appendix

A.1 Appendix 1: Sample Product Recall Announcement

Toddler Girl Garments Recalled by American Eagle Outfitters Due to Choking Hazard

WASHINGTON, D.C. - The U.S. Consumer Product Safety Commission, in cooperation with the firm named below, today announced a voluntary recall of the following consumer product. Consumers should stop using recalled products immediately unless otherwise instructed. It is illegal to resell or attempt to resell a recalled consumer product.

Name of Product: Toddler Girl Pants and Shorts

Units: About 1,200

Importer: American Eagle Outfitters Inc., of Pittsburgh, Pa.

Hazard: The metal clasp at the waistband can detach from the garment, posing a choking hazard to young children.

Incidents/Injuries: None reported.

Description: This recall involves toddler girl pants, jeans and shorts sold in various styles. The style number is printed on a sewn-in label located under the care/content label on the inside of the waistband. The garments were sold in sizes 12-18 months through 5 years. Style numbers included in this recall are listed below:

Garment	Style Number
Skinny Cord	3007
Boyfriend Vintage Wash	3012
Cut Off Bermuda Short	3013
Flare Vintage Blue Wash	3029
Flare LT Wash	3030
Flare Rip and Repair	3034
Roll Cuff Bermuda Short	3035

Sold exclusively at: 77kids by American Eagle stores nationwide and at www.77kids.com between July 2010 and August 2010 for between \$24 and \$34.

Manufactured in: China

Remedy: Consumers should immediately take the recalled garments away from children. Consumers who purchased the garments online will receive a postage-paid envelope with instructions on how return the garment for a full refund. All other consumers should return the garments to the nearest 77kids by American Eagle store for a full refund.

Consumer Contact: For additional information, contact American Eagle Outfitters toll-free at (888) 307-3672 between 9 a.m. and 5 p.m. ET Monday through Friday or visit the firm's website at www.77kids.com

A.2 Appendix 2: Comparing Market Model with Fama French and Fama French with Momentum

	Market Model	Fama French	Fama French with Momentum
Intercept	.00034 (.052)		
Quality	.067 (.020)*		
Cultural distance	---		
Country Brand	---		
Depth of action	-.021 (.009)*		
Proactive	-.0047 (.008)		
Severity of hazard	.0027 (.007)		
Action costs	-.0015 (.002)		
Sales	.0034 (.004)	.0034 (.004)	.0034 (.004)
Liability	-.0038 (.004)	-.0038 (.004)	-.0038 (.004)
Book value	-.0011 (.008)	-.0011 (.008)	-.0011 (.008)
Market value	.0045 (.008)	.0045 (.008)	.0045 (.008)
Industry fixed effect	yes*	Yes*	yes*
Year fixed effect	yes*	yes*	yes*

A.3 Appendix 3: Robust Regression Analysis

Q + CD	Market Model	HLM	Robust Regression (M)	Empirical Sandwich
Intercept	.0064 (.055)	.0064 (.055)	-.048 (.043)	.057 (.072)
Quality	.063 (.02)*	.063 (.020)*	.014 (.015)	.052 (.016)*
Cultural distance	-.0012 (.0029)	-.0012 (.0029)	-.0026 (.0021)	.00023 (.0027)
Country Brand	---	---	---	---
Depth of action	-.021 (.009)*	-.021 (.009)*	.0055 (.0043)	-.018 (.0086)*
Proactive	-.0045 (.0076)	-.0045 (.0076)	.0027 (.0053)	-.0071 (.0068)
Severity of hazard	.0026 (.0072)	.0026 (.0072)	.0135 (.0040)	.0049 (.0069)
Action costs	-.0017 (.0021)	-.0017 (.0021)	-.0013 (.0014)	-.00053 (.0019)
Sales	.0034 (.004)	.0034 (.004)	.0034 (.004)	.0034 (.004)
Liability	-.0038 (.004)	-.0038 (.004)	-.0038 (.004)	-.0038 (.004)
Book value	-.0011 (.008)	-.0011 (.008)	-.0011 (.008)	-.0011 (.008)
Market value	.0045 (.008)	.0045 (.008)	.0045 (.008)	.0045 (.008)
Industry fixed effect	yes*	Yes*	yes*	yes*
Year fixed effect	yes*	yes*	yes*	yes*