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The Moral Limits of the Market: Science Commercialization and Religious Traditions

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Abstract Entrepreneurs of contested commodities often face stakeholders engaged in market excluding boundary work driven by ethical considerations. For example, the conversion of academic scientific knowledge into technologies that can be owned and sold (i.e., science commercialization) is a growing global trend and key stakeholders have different ethical responses to this contested commodity. Commercialization of science can be viewed as a good thing because people believe it bolsters economic growth and broadly benefits society. Others view it as bad because they believe it discourages basic research that ought to be freely shared without concern for profit. Taking a descriptive sociological approach, we posit that the stance of a religious tradition toward capitalism will help shape individual scientists' views on science commercialization and test whether the religious tradition of scientists correlates with their attitude toward the commercialization of science. To maximize variance on the religious tradition dimension, we analyze pooled data from a cross-national survey of university biologists and physicists encompassing France, Hong Kong, India, Italy, Taiwan, Turkey, UK and the USA. We indeed find religious tradition differences. Hindus and scientists with no religious tradition are more likely to agree that commercialization of science "harms a university's commitment to knowledge production" than Protestants. We end with a discussion on business ethics and the moral limits of the market as well as implications for entrepreneurs of contested commodities.

Keywords Academic capitalism · Contested commodity · Religion

Introduction

As entrepreneurs seek to create new products and services in countries across the globe, they may find themselves pushing against the moral limits of the market. In other words, some stakeholders may ethically resist contested commodities, or objects and services that many consider to be inappropriate to sell. Carruthers and Ariovich (2004) query, "What can be owned? Different societies give different answers, but none permit everything to be owned. The inclusion of new objects or exclusion of old ones is a process variably shaped by political, cultural, economic and technological factors" (p. 25). Indeed, culture—here defined as norms and conventions that are "taken for granted" by individuals who are subject to the cultural forces—plays a normative regulatory role in helping determine what is appropriate behavior in the economy (DiMaggio 1994). Yet, to date, the role of culture in placing moral limits on commercial practices remains understudied. In this descriptive sociological analysis, we address this gap by examining whether religious traditions help explain the variable market excluding boundary work of stakeholders.

We focus, in particular, on the commercialization of academic science, which we define as the conversion of scientific knowledge into technologies that can be owned and therefore sold. Commercialization in higher education

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entails activities such as industrial sponsorship of research, patenting of discoveries as intellectual property and licensing of patents to existing companies or scientists' "spinoff" companies. Commercialization is not a new phenomenon, but over the past 30 years there has been a radical acceleration of commercial culture in US universities (Berman 2012; Johnson 2017; Slaughter and Leslie 1997), while other countries around the world have more recently began to emulate this emphasis (Cantwell and Kauppinen 2014).

The presence of commercial values and practices in core activities of academe has raised a number of ethical issues regarding the production of knowledge and the role of universities in society. From one perspective, commercialization generates conflicts of interest, threatens the notion of knowledge as a public good and undermines the integrity of the research process (Bok 2003; Bowie 1994; Krimsky 2003; Mirowski 2011; Slaughter and Rhoades 2004; Slaughter et al. 2014). In this respect, science is a contested commodity. Another view is that commercialization fosters economic development, new technological solutions to sources of uncertainty in society and new sources of revenue for higher education (Etzkowitz 2008; Geiger and Sa 2009). One body of research focuses on how scientists' attitudes toward the appropriateness of commercialization are shaped by factors such as professional socialization, scientific fields and the organizational contexts in which scientists work (Lam 2010). Yet, scholars have ignored other social institutions, such as religious traditions, that we would expect to shape scientists' views.

In a vein similar to Weber's (1905 [2009]) seminal Protestant Ethic thesis, we explore whether cultural forces that inhere in particular religious traditions help shape attitudes toward capitalism. Scholars argue that science commercialization is a central component of academic capitalism because commercialization introduces the profit motive into the production of knowledge (Slaughter and Rhoades 2004). Since profit orientation is a defining characteristic of capitalism (Swedberg 2005), we review existing literature on religious traditions' posture toward capitalism, broadly speaking, to derive our hypothesis that Protestant scientists are most likely to support the commercialization of science.

In this article, we first discuss our main phenomenon of interest, the moral limits of the market. We then explore how science commercialization is a valid and interesting case of this phenomenon. We then motivate a hypothesis that Protestant scientists are most likely to support the commercialization of science. We analyze data from the Religion among Scientists in International Context study, a cross-national survey that is representative of university biologists and physicists in France, Hong Kong, India, Italy, Taiwan, Turkey, UK and the USA, regions that exhibit established or expanding commercial application of science. Partially supporting our hypothesis, we find that relative to Protestants, Hindus and scientists with no religious tradition are more likely to agree that commercialization of science "harms a university's commitment to knowledge production." We end with a discussion of the broader implications for business ethics.

The Moral Limits of the Market

Moral philosophers have argued that some contested commodities should not be for sale and that there are moral limits to the market (Sandel 2012; Satz 2010). In response, Brennan and Jaworski (2015b) argue such limits are symbolic in nature by, in part, drawing upon sociological research to "provide evidence that the meaning of markets and of money is, in general, a highly contingent, fluid social constructed fact" (p. 1057). In this article, we follow a rich sociological tradition that emphasizes variance in how different stakeholders engage in market excluding symbolic boundary work. "Symbolic boundaries are conceptual distinctions made by social actors to categorize objects, people, practices, and even time and space" (Lamont and Molnar 2002: 168). In this article, we theorize the symbolic boundaries made by scientists to exclude commercializing forces from entering the scientific sphere. Conversely, we recognize many scientists are not engaged in market excluding boundary work and are more accepting of commercializing science.

Exemplifying this article's descriptive approach to the study of market excluding boundary work, Zelizer (1978) explains how purchase of life insurance was initially anathema to many nineteenth-century Americans, because it necessitated putting a price tag on a human life. Interestingly, during the nineteenth century, "fundamentalist" and "modernistic" religious traditions differed in their reception of the new market ware. Fundamentalists "denounced life insurance to their congregations as a secular and sacrilegious device that competed against God in caring for the welfare of widows and orphans," while religious "liberals" tended to offer their support (Zelizer 1978: 596). Similarly, Quinn (2008) explores the variable reception of the secondary market for life insurance, where investors can buy strangers' life insurance policies. Almeling (2007) explores the differential reception of sperm banks and female egg agencies, both of which commodify the very ingredients of human life. Evans (2003) shows that the kind of commodification of bodily organs (i.e., money versus a voucher that that can only be used to help pay for the medical expenses of the patient) makes a difference in decision making about whether or not to end the life of an unconscious patient on life support. He finds being offered a voucher increases the likelihood of survey respondents indicating they would end life support.

Perhaps unsurprisingly, ethicists and stakeholders tend to be wary of the market's expansion into realms closely identified with "life," which many view to be sacred. More specific to our article's focus on science commercialization, Hesse (2002) exemplified historical variance in the acceptance of intellectual property rights, i.e., "the idea that an idea can be owned" (p. 26). During the Middle Ages, knowledge was typically viewed as a gift from God and beyond the purview of copyright laws. During the Enlightenment, however, a Human Rights perspective viewed knowledge as an inalienable human right. Hesse (2002) explains the historical trajectory as follows: "While limits might be imposed upon patents for mechanical inventions, products of the mind—bearing the personhood of their author—ought to belong perpetually to their creator. Intellectual property, an invention of the eighteenth century, thus burst into the world claiming to be real property in its purest form" (Hesse 2002: 33). In contrast, Social Utilitarianism demurred the market's overreach by favoring the treatment of "knowledge" as an objective product of *society* that should therefore be treated as a social good to be leveraged to help society, as opposed to the sole property of an individual that is for sale.

This article's focus on the commercialization of science makes a substantial contribution to the field of business ethics by enhancing our understanding of the more general phenomenon of stakeholders' market excluding boundary work. Bowie (1994) examines the ethical consequences (both good and bad) of universities partnering with business while acknowledging that "historically the values of science have been different from and perhaps antithetical to the values of business" (p. 86). Recent scholarship has also explored the ethical issues surrounding the commercialization of stem cell research (Herder and Brian 2007) and genetic testing (Williams-Jones and Ozdemir 2007). Better understanding the market excluding boundary work of stakeholders can inform business ethicists' understanding of a variety of contested commodities. For example, e-commerce firms in the USA are pushing the limits of commoditizing and selling "private" data collected from unaware consumers (Martin 2015; Smith 2001). There is also an increased interest in seeking market solutions to pressing social problems (Prahalad and Hammond 2002). For instance, carbon tax proponents propose a market where firms can buy and sell the right to pollute (Dhanda and Hartman 2011).

Commercialization of Science

Indeed, intellectual property is at the heart of "academic capitalism," which refers to market behaviors in universities and among faculty who are motivated by competition for economic profits (Slaughter and Leslie 1997). The conversion of scientific knowledge into technologies that can be owned and therefore sold (i.e., the commercialization of science) represents an important contemporary example of a contested commodity. Universities were once considered the singular institutional sphere in society where certified knowledge is created unencumbered by market forces (Geiger 1988). This historic status overlapped with an orthodox economic theory of science—characteristic of the period between World War II and the 1960s—in which the federal government invested in science because knowledge was viewed as a public good that should be funded by the public sector (Arrow 1962; Nelson 1959). Seeds of a market logic in academe were present, but the notion of conducting science for the sake of science prevailed. During the late 1960s and 1970s, however, global competition, strained federal budgets, the rise of biotechnology and the decline of research and development in the corporate sector ultimately led some industrialized nations to revisit how science should be organized in society. US policymakers began to view academic science as an economic engine (Berman 2012) and passed legislation making it much easier for universities to patent and license intellectual property resulting from academic scientific research. Beginning in the USA, but subsequently in other industrialized nations, neoliberalism—which emphasizes the market as the most effective mechanism for distributing goods and services (Mirowski 2011)—replaced the orthodox economic theory of science (Brandl and Glenna 2017).

This shift entailed new questions regarding whether the engagement of academic scientists in commercial activities, such as patenting, harms university commitment to knowledge production. Research has since documented data withholding and secrecy among academic scientists as a result of commercial forces (Blumenthal et al. 1986; Vogeli et al. 2006). Industrial funding for academic research has been associated with biased research (Krimsky 2003), and other studies have pointed to individual and institutional conflicts of interest that emerge when scientists and universities stand to financially benefit from the outcomes of their research (Slaughter et al. 2014). On the other hand, the introduction of a profit motive in academic science can play an important role in generating technological solutions to societal problems related to human well-being, for example, while creating economic opportunities and growth in local, state and national markets (Etzkowitz 2008; Geiger and Sa 2009).

As neoliberal science policy accelerated commercial culture in academic science, scholars began to examine how academic scientists perceive and experience commercialization. Hackett (1990) theorized that alienation and anomie among scientists would accompany these changes in the structure of science and argued that as research groups begin to act like "quasi-firms," value tensions would emerge that may separate scientists from their colleagues and the fruits of their labors (Hackett 1990, p. 237). While

subsequent analyses have shown how commercially oriented audit culture (Tuchman 2011) and accountability regimes (Strathern 2000) can threaten traditional academic values (Johnson 2017), other research has demonstrated why many scientists view commercial practices as legitimate. Smith-Doerr (2005), for example, finds that academic scientists in biotechnology believe that commercialization increases professional autonomy and access to information and prestige networks. Focusing on academic scientists in biotechnology in Boston and San Francisco, Vallas and Kleinman (2008) find that as commercial science adopted conventions specific to academe, scientists in academe are more likely to embrace entrepreneurial culture. Importantly, scientists' attitudes toward commercialization vary. Owen-Smith and Powell (2001), for example, show how attitudes toward commercialization vary by cohort. Survey research suggests that market science values are associated with fields characterized by applied research agendas (Glenna et al. 2011) and field-level entrepreneurial activity (Shibayama et al. 2012). Such values also matter for scientific output. Glenna et al. (2011), for example, find that having a market orientation (i.e., believing that scientists should produce knowledge with market potential) results in higher proprietary activity.

It is worth noting that when scholars analyze attitudes toward commercialization, or whether they hold market-oriented values, the focus is predominately on properties of a scientists' organizational environment (Bercovitz and Feldman 2008; Owen-Smith and Powell 2001) or views of science and the market. Johnson (2017), for example, focuses on whether scientists embrace formally rational values such as the calculability of societal impact through the market, while Glenna et al. (2011) consider factors such as whether scientists believe the market or scientists are best equipped to determine the social value of a new technology. Underemphasized in such research are other aspects of scientists' lives that may shape their views toward commercialization. Whittington (2011) offers an exception in her study of the impact of motherhood on patent productivity, which illustrates that female scientists with children are especially unlikely to patent their work. The important point here is that a scientist's attitude toward commercialization may be shaped by other social institutions that—despite not having an apparent connection to their professional identity—may nevertheless matter.

Religious Tradition and Capitalism

Religion is one such social institution that shapes individuals' beliefs and values. While studies have demonstrated that specific religious beliefs help explain economic outcomes like patenting (Bénabou et al. 2015a), innovation, (Bénabou et al. 2015b) and economic growth (Barro and McCleary 2003), there is limited research on the role religious *tradition* plays in shaping attitudes toward commercialization. In scholarly work on science commercialization, the religiosity of scientists has been completely ignored. This may be due in part to an assumption that religion is irrelevant to most academic scientists. A global perspective on religion among scientists, however, indicates that a substantial proportion of scientists around the world identify as religious (Ecklund et al. 2016). More theoretically, our conceptual approach follows a rich social science tradition of focusing on the cultural determinants of the economy. Culture plays a normative regulatory role in helping determine what is appropriate behavior in the economy (DiMaggio 1994). We conceptualize culture as norms and conventions that are "taken for granted" by individuals who are subject to the cultural forces. In particular, we focus on how norms within religious traditions help shape one's attitude toward capitalism.

Because we are unaware of existing literature that specifically addresses how various religious traditions shape the market excluding boundary work around science, we turn to the broader existing literature on religious traditions and capitalism. Swedberg (2005) describes capitalism as an economic system whose production, distribution and consumption are primarily driven by a profit orientation. While we recognize there are a variety of capitalisms (Hall and Soskice 2001), we conceptualize this "profit orientation" as capitalism's defining characteristic. We hypothesize that followers of religious traditions that tend to more strongly resist capitalism's profit orientation are also more likely to engage in market excluding boundary work around science. Conversely, followers of religious traditions that are more amenable to capitalism will view the market's infringement as less harmful.

Protestantism

Most famously, Weber (1905 [2009]) argued that Protestant norms, Calvinism in particular, helped galvanize modern rational capitalism. Weber argued that devout Protestants poured their religious (i.e., value-rational) motivations into the methodical pursuit of profit and wealth and that this led to the accumulation of capital. Protestant asceticism, Weber argued, ensured the capital was not wantonly spent on one's self, but reinvested in the religious entrepreneur's economic enterprise. With this famous historic explanation, Weber counterintuitively points to the cultural norms associated with Protestantism that, he argued, provided the spark that helped create modern rational capitalism. Part of what makes this explanation counterintuitive is that Weber downplays the importance of material interests (i.e., greed for wealth) and instead emphasized religion's otherworldly orientation. While Weber suggests the spirit of capitalism, by the eighteenth century, no longer required its original

Protestant underpinnings, other scholars, nonetheless, have continued to find a particular resonance between Protestantism and capitalism.

One way scholars have extended Weber's seminal Protestant Ethic Thesis is to explore whether the dominant religious tradition of a country helps explain its economic development. Inglehart and Baker (2000) conclude, "Protestant religious institutions gave rise to the Protestant Ethic, relatively high interpersonal trust, and a relatively high degree of social pluralism-all of which may have contributed to earlier economic development in Protestant countries than in the rest of the world" (p. 38). Landes (1998) argues Protestant countries tend to have stronger support for private property rights. Using the World Values Survey item that asked respondents the extent to which they agree with, "Competition is good. It stimulates people to work hard and develop new ideas," Hayward and Kemmelmeier (2007) find that the percent of Protestants in a country is positively correlated with endorsement of competition, despite Guiso et al. (2003) contrary findings. In a different study, Hayward and Kemmelmeier (2011) operationalize pro-market attitudes with survey measures on (1) we need large income differences as incentives, (2) private ownership of business should be increased, (3) people should take more responsibility to provide for themselves and (4) competition is good, it stimulates people to work hard and develop new ideas. They find support that Protestantism is associated with economic values conducive to free-market capitalism.

We acknowledge the contested status of common interpretations of Weber's Protestant thesis that capitalism *first* thrived among Protestants (Delacroix and Nielsen 2001). For the sake of this article, it is sufficient to assert that contemporary Protestants tend to have high levels of support for free-market capitalism and we expect scientists who identify as Protestants to be most amenable to the commercialization of science, relative to the other major religious traditions, and scientists who do not identity with a religious tradition at all.

Hypothesis Protestant scientists are least likely to agree that engagement of academic scientists in commercial activities harms a university's commitment to knowledge production.

Testing this hypothesis requires comparing scientists from each religious tradition (our key independent variable) with Protestant scientists, which we will accomplish by modeling Protestantism as the statistical reference category in our forthcoming multivariate regression analysis. This tests whether Catholic scientists differ from Protestant scientists, whether Hindu scientists differ from Protestant scientists, and so on and so forth for each of the nine religious tradition categories we measure (including no religious tradition). Therefore, to avoid redundancy, we refrain from officially positing each precise hypothesis for each additional religious tradition answer category we measure. Indeed, many of these religious traditions lack a robust literature on its relationship with capitalism. We therefore review literature for a few of the religious traditions with the most existing literature on its respective relationship with capitalism, namely Catholicism, Hinduism and Islam.

Catholicism

Catholic social teaching is often interpreted to contain significant critiques of capitalism. McCann (1997) applies Catholic social teaching to the ethics of corporate downsizing and emphasizes the Catholic impulse to value labor over capital. Firer-Hinze (2007) contends Catholic social teaching, since 1891, has stressed the moral imperative of wage justice. Namely, "Economic justice is therefore understood as necessarily including measures that promote and protect family life. A right to a *family* living wage—that is, a wage sufficient to assure a basic level of material security…is implied in Leo XIII's *Rerum Novarum* and is explicitly articulated in Pius IX's *Quadragesimo Anno*" (p. 297). Melé (2015) stresses the implications of human dignity for humane working conditions of labor and an expansive view of human development that includes spirituality and the refinement of virtues that lead to human flourishing. "Development cannot be reduced to economic progress… which reduces development to wealth accumulation. Development should be oriented to the service of people" (Melé 2015: 132). In a similar vein, Costa and Ramus (2015) emphasize that Catholic social teaching suggests business should pursue the common good, which requires a willingness to blend not-for-profit orientations with for-profit orientations. Goodpaster (2011) posits that Catholic social teaching requires business leaders to "question whether the goods are truly good" or whether they are harmful to society (p. 9). In sum, existing empirical research and multiple interpretations of Catholic social teaching mounts the expectation of a substantial Catholic resistant to unfettered capitalism. This supports our expectation that Catholic scientists are more likely than Protestant scientists to agree that engagement of academic scientists in commercial activities harms a university's commitment to knowledge production.

Hinduism

The Hindu caste system has been discussed in relationship to capitalism. To help explain India's supposed slow economic development at the time, Weber (1924 [1961]) points to the "magical" power of the Hindu caste system as an explanation for why capitalism did not originate among Hindu groups. In Weber's words: "Every caste makes every other impure. In

consequence, workmen who dare not accept a vessel filled with water from each other's hands, cannot be employed together in the same factory room… Obviously, capitalism could not develop in an economic group thus bound hand and foot by magical beliefs" (p. 265). Weber's explanation likely represents a colonialist's mindset and therefore needs to be interrogated (Gellner 1982). But Das (2002) too points to Hinduism's caste system that ranks the Bania (merchant) caste third in its caste hierarchy, behind Brahmin and Kshatriya (i.e., warrior and landowner, respectively) as in part responsible for capitalism's slow growth in India. This legacy of Hinduism has led to what has been called by some as a general distaste for "money making," and Das (2002) argues this is a key explanation for India's slow economic development. In sum, what other scholars have said about Hindu's caste system and its antagonistic relationship with capitalism might support our expectation that Hindu scientists are more likely than Protestant scientists to agree that engagement of academic scientists in commercial activities harms a university's commitment to knowledge production.

Islam

Scholars have argued that Islamic economics provide a "third way" that economic systems can operate, substantially different than capitalism and socialism (Hefner 2006; Safar-Aly 2016). Hefner (2006) suggests Islamic economics is predicated upon "Islamic traditions of law and organization [to] provide a more just and equitable model for economic growth than do the rival systems of Western capitalism and socialism" (p. 17). Two institutions of Islamic economics that differentiate it from capitalism are Islamic banking's prohibition of riba (i.e., the collection of interest) and the zakat (i.e., religiously mandated almsgiving).

The zakat's mandate to redistribute one's wealth is one way that Islam restrains one's ownership rights (Facchini 2013). "Ownership does not come first. It depends upon superior moral principles, which include the submission of man to God and His principles" (Facchini 2013: 145). Sait and Lim (2006) focus on private ownership of land and explain, "In the Islamic system, private property rights are promoted but the ultimate ownership of God over land is assumed and requires all rights to be exercised within the Islamic legal and ethical framework with a redistributive ethos" (p. 3). Both the ownership of God and obligations to redistribute the wealth that private property earns could attenuate the strength of property rights in countries influenced by Islam. Indeed, Muslim countries tend to earn low scores on the Heritage Foundation Property Rights Index (Facchini 2013; Sait and Lim 2006), which in part measures the degree to which a country's laws protect private property rights. In a similar focus on property rights, to explain the economic underperformance of Muslim Indians (relative to Hindu Indians), Kuran and Singh (2013) claim the "Islamic inheritance system hampered economic modernization by fragmenting successful businesses, by discouraging the pooling of resources on a large scale, and by driving capital from flexible commercial ventures to inflexible family waqfs" (p. 532).

In sum, Islamic economics parts ways from capitalism, in part by weaker ownership rights. We therefore expect Muslim scientists to be more likely than Protestant scientists to agree that engagement of academic scientists in commercial activities harms a university's commitment to knowledge production.

Data

The Religion among Scientists in International Context (RASIC) study surveys biologists and physicists from the following non-randomly selected regions: France, Hong Kong, India, Italy, Taiwan, Turkey, UK and the USA [see Ecklund et al. (2016) for a complete methodological description]. We recognize that this data set does not enable generalizations to be made about all scientists in the world, because many countries are not sampled and because biology and physics are only two of many scientific disciplines. We refrain from universal claims, but will frequently refer to "scientists" in this article in place of "biologists and physicists in our sampled regions" in order to streamline readability.

The sampling frame of scientists surveyed was constructed by a two-stage sampling procedure. In the first stage, a sampling frame of organizations (i.e., universities and research institutes) was constructed. Within each region, organizations were identified by examining the affiliations of authors on biology and physics academic journal articles published between 2001 and 2011 that were randomly sampled through the Thomas Reuter Web of Science (WOS) database. In total, 1905 organizations (1079 biology and 826 physics) were identified. Organizations were then stratified by a triangulation process to determine whether an organization was elite or not. The research productivity (the number of times an organization appears as the affiliation of an author in a WOS journal article), evaluations by scientists from each region in the study and existing in-region ranking systems (e.g., National Research Council Rankings for the US region) were used for this determination. From this stratified sampling frame of organizations, a roughly equal number of organizations from each stratum were randomly selected.

For the second stage in the sampling procedure, organizational (e.g., academic department) Web sites were used to construct a sampling frame of individual scientists, who were then stratified by rank and gender. For rank, individuals

were parsed into three categories: (1) scientists in training (e.g., graduate students), (2) junior scientists who have finished their training (e.g., postdoctoral fellows, assistant professors, or equivalent rank in each nation) and (3) advanced scientists (e.g., associate and full professors or equivalent rank in each nation). Gender was estimated by viewing the name, and additional information if necessary. To ensure our sample was not overcrowded with graduate students and men, we selected roughly an equal number of scientists from each stratum. In the forthcoming analysis, however, statistical weights are used to correct for the intentional over and under sampling in this sampling procedure.

The survey was fielded by two different survey firms: GfK NOP for two regions and Abt SRBI for the remaining. All communication, including advance contact and the survey instrument, was offered in the native language of each region and English. In the end, there were 9422 completed surveys. Using the American Association for Public Opinion Research's definition number 3 for response rates, the survey obtained an overall response rate of 42% and in-region response rates ranging between 39% in Turkey and Taiwan to 57% in the USA.

Measures

Dependent Variable

The single-item dependent variable used to predict disapproval of science commercialization borrows wording from Lam (2010).[1] The question reads, "Please indicate the extent to which you agree or disagree with the following statement. The engagement of academic scientists in commercial activities harms a university's commitment to knowledge production. Do you… (1) Strongly disagree, (2) Somewhat disagree, (3) Have no opinion, (4) Somewhat agree, (5) Strongly agree, (6) Don't know." We predict the ordinal outcome, with values ranging from 1 to 5. We also drop respondents who answer Don't Know (2% of sample) and respondents who refuse to answer (3%).

Key Independent Variable

To measure religious tradition, the survey borrows the World Values Survey's question and answer categories. All respondents are asked, "Do you belong to a religion or religious denomination? If yes, which one?" We code their responses into the following indicator variables; I do not belong to a religion, Roman Catholic, Protestant, Orthodox (Russian, Greek, etc.), Jew, Muslim, Hindu, Buddhist, Other and Refused. In each region, "Other" is a visible survey instrument answer category that respondents could select. We also coded the following individuals as Other; India respondents who selected Jain and Sikh categories (visible only to India respondents) and Taiwan respondents who selected "Folk beliefs/folk religion," Taoism, or Yiguan Dao (visible only to Taiwan respondents). To avoid dropping respondents from analysis who refused to answer this question, we code all respondents with missing data on this variable into the Refused category.

Covariates

To test our hypotheses, we include germane covariates in our model to minimize omitted variable bias concerns. Given the reasonable number of regions included in this data set, and to ensure region-level differences are accounted for, indicator variables for each region are included in all models.

Since our primary focus is on one facet of religiosity (i.e., religious tradition), we are careful to also include common religiosity covariates that operationalize the extent to which one identifies as "religious," religious behavior and religious belief. This thorough approach acknowledges the complexity of religiosity. For example, one may identify as Catholic, but not believe in God, rarely attend religious services and feel uncomfortable identifying as a "religious person." The following religiosity covariates methodologically account for such religious complexity.

To measure religious identity, the survey asks, "Independently of whether you attend religious services or not, would you say you are, (1) A very religious person, (2) A moderately religious person, (3) A slightly religious person, (4) Not a religious person, (5) An atheist, (6) Don't know." Respondents who answer 1 through 3 are coded, *Religious Person* = 1, and the remaining as zero. To measure a salient religious behavior, respondents are asked, "Apart from weddings and funerals, about how often do you attend religious services these days? (1) More than once a week, (2) Once a week, (3) Once a month, (4) Only on special holy days, (5) Once a year, (6) Less often, (7) Never, practically never." Respondents who report attending once a month or more are coded *Attend* = 1, and the remaining as zero.

Existing research has found religious beliefs correlate with innovation (Bénabou et al. 2015a, b) and economic growth (Barro and McCleary 2003). We therefore include as a covariate in our model Belief in God, measured as follows: "Please indicate which statement below comes closest to expressing what you believe about God. Would you say… (1) I don't believe in God, (2) I don't know whether there is a God and I don't believe there is any way to find out, (3) I don't believe in a personal God, but I do believe

[1] The original wording is as follows: "engagement in commercial activities has the potential to confuse [sic] university's central commitment to knowledge production" (p. 320).

in a Higher Power of some kind, (4) I find myself believing in God some of the time, but not at others, (5) While I have doubts, I feel that I do believe in God, (6) I know God really exists and I have no doubts about it." Respondents in the top two categories of belief are coded *Belief in God*[2] = 1, and the remaining as zero.

It is reasonable to expect that patent holders have particular attitudes toward science commercialization. We therefore include a self-reported measure, derived from the following survey question. "How many patents, if any, do you have?" *Patent Holder* = 1 for all respondents who own at least one, and the remaining respondents are coded as zero. To operationalize academic discipline, we use a variable created during the sampling procedure. For those respondents initially determined to be in a biology department, *Biologist* = 1, and *Biologist* = 0 for those determined to be in the physics discipline. Furthermore, for those the sampling procedure determined to be from an elite university, *Elite University* = 1, and for the remaining, *Elite University* = 0. Attitudes toward commercialization may also be shaped by the scientists' tenure status, measured by the following survey question: "Which of the following best describes the nature of your professional position? (1) My position is permanent (e.g., tenure or equivalent), (2) I am moving toward a permanent position at this institution (e.g., tenure-track or equivalent), (3) My position is on a finite or renewable contract basis (non-tenure-track)." Those whose position is permanent are coded *Tenure* = 1, and the remaining as zero.[3]

Since research funding might be an additional source of income, and commercialization of science might yield an additional revenue stream to scientists, we measure *High Research Funding* with the following survey question: "Which of the following best characterizes how much research funding you have had, in the past 3 years, relative to other researchers in your discipline at universities in" the respondent's region? (1) No research funding, (2) Below average research funding, (3) Average research funding, (4) Above average research funding, (5) Don't know." Those who report "above average" funding are coded *High Research Funding* = 1, and the remaining as zero. Most scientists are expected to publish their research, which is the most standard "final package" of scientific research. Respondents indicate the number of their "writings (solo authored or co-authored) that have been published or have been accepted for publication within the past 3 years in refereed journals (not counting abstracts)." Answer categories include 0, 1–3, 4–6, 7–10, 11–20, 21–50, 51–100, 101–200 and more than 200. Recognizing publication quantity norms vary by our featured disciplines and by region, we code *More Publications* = 1 for those in upper half in their discipline (and in their region) and *More Publications* = 0 for everyone else.

Given the recognized importance of gender with respect to commercialization (Bunker Whittington and Smith-Doerr 2008), Women are coded *Female* = 1, and those who do not identify as female are coded as zero. Each region's survey instrument included appropriate questions and answer categories to measure family income. *Income* = 1 for those in upper half of each region's resulting income distribution (as measured by this survey) and the remaining, including those who refused to answer, are coded *Income* = 0.

Political orientation is also important to consider because a conservative political orientation may correlate with certain religious traditions. Furthermore, a conservative orientation may correlate with increased acceptance of science commercialization. The following questionnaire item, borrowed from the World Values Survey, is used to measure political orientation: "In political matters, people talk of "the left" and "the right." Using a scale where "1" means "left" and "10" means "right," how would you place your views on this scale, generally speaking?" We measure a binary *Political Conservative* measure where 1 includes everyone who gave an answer of 6 or higher. Everyone else, including the 9% of the sample who refused to answer the question, is coded with a zero. Additional analysis (not shown in this article) confirms that dropping these non-respondents from analysis does not change the forthcoming results.

Methodology

Given the ordinal outcome of interest, we employ ordered logistic regression to test our hypothesis. Odds ratios coefficients are reported, which means values above 1.0 represent increased likelihood of indicating "commercial activities harms a university's commitment to knowledge production." Values below 1.0 represent a decreased likelihood. Because of the data set's nested data structure, it is reasonable to expect respondents from the same department to be more similar to one another on a wide variety of measures than to respondents from different departments. To account for these nested data, we treat a department indicator variable (i.e., a variable where each scientist with the same value is from the same department) as the primary sampling unit in

[2] Answer categories for Hong Kong and Taiwan respondents refer to "God/gods" to account for belief in multiple gods.

[3] The UK and India survey instruments do not directly measure *Tenure*. We develop proxies for both based on the respondents' self-reported professional position. For the UK, *Tenure* = 1 for Senior Lecturers, Readers, and Professors. In India, *Tenure* = 1 for Assistant Professors, Associate Professors, and Professors.

Stata's complex survey design command.[4] This is identical to calculating clustered robust standard errors, where the department code is the cluster variable.

Results

To briefly highlight some descriptive statistics of the entire data set's non-missing observations for each variable (see Table 1), we first learn that mean estimates of agreeing that commercialization harms knowledge ranges from 2.56 (in the UK) to 3.27 (in Turkey). In other words, on average, scientists in our study tend to somewhat disagree or have no opinion with the claim that commercialization harms knowledge. Looking at the proportion of scientists in various religious traditions in each country reveals that 56% of Italian scientists identify as Catholic, 73% of Turkish scientists as Muslim and 79% of Indian scientists as Hindu. Large proportions of scientists in many countries identity with no religious tradition, well over half in France, Hong Kong, UK and the USA. Patenting is one way that scientists commercialize their science. This self-reported measure ranges from 4% of Turkish scientists holding a patent to 28% among Hong Kong scientists.

Model 1 in Table 2 just includes covariates. It shows that, without considering the scientists' religious tradition, those who hold patents, women and political conservatives are less likely to agree that commercialization harms knowledge. To account for the country or region in which scientists are employed, indicator variables are included in this model as well. Turkey is the referent category because it has the highest mean level of agreement that commercialization harms knowledge. Relative to Turkey, Italy, the UK and the USA have lower levels of agreement that commercialization harms knowledge.

Model 2 includes our key independent indicator variables for each scientists' religious tradition. We select Protestantism as the statistical referent category to test our hypothesis. After controlling for all other variables, we find that Hindus and scientists who claim no religious tradition are more likely than Protestants to agree that commercialization harms knowledge. This provides partial support for our hypothesis that claims Protestant scientists are less likely than all remaining religious traditions (or lack thereof) to claim commercialization harms knowledge. In sum, we find substantial and statistically significant differences, but not with *all* religious traditions, just Hinduism. Perhaps most surprising, scientists with no religious tradition are also particularly likely to agree that commercialization harms knowledge.

[4] The following Stata code was used: svyset DepartmentIndicatorVariable [pw = weight].

The magnitudes of the religious tradition coefficients in Model 2 (i.e., 2.26 for Hindu and 1.60 for No Religion) are substantial. To interpret the statistically significant odds ratios in Model 2, we calculate the predicated probability of strongly agreeing (i.e., the largest answer category of our ordinal outcome) that commercialization harms knowledge. Protestants have a 7% predicted probability of strongly agreeing that commercialization harms knowledge, with all other variables in the full model being held at their respective means. Those who do not select a religious tradition have an 11% predicted probability and Hindus have a 14% predicted probability. Notably, there is a 7% differential (i.e., 14–7) of predicted probabilities between Protestants and Hindus.

Turning now to interpretation of the statistically significant covariate results in Model 2, we find that Turkish scientists have a 15% predicted probability of strongly agreeing that commercialization harms knowledge, relative to UK scientists at 8% and US scientists at 9%. In Model 2, the remaining countries are no different than Turkey. Those who hold a patent have a 5% predicted probability of strongly agreeing that commercialization harms knowledge, compared to 10% for those who do not hold a patent. Female scientists have an 8% predicted probability of strongly agree that commercialization harms knowledge, while men have a 10% predicted probability. Political conservatives have an 8% predicted probability, compared to a 10% probability for everyone else.

To interpret how important religious tradition is in shaping commercialization attitudes, it is noteworthy that the 7% differential of predicted probability between Hindus and Protestant represents the largest magnitude in our analysis, on par with the difference between Turkish and UK scientists. The patent holder versus non-patent holder differential is 5 percentage points. In other words, our results indicate that knowing whether a scientist identifies as a Protestant or Hindu is more helpful in predicting his or her attitudes about science commercialization than knowing whether or not he or she holds a patent.

To confirm the robustness of our central Hindu and religious none effects, we analyze the data in slightly different ways. First, we know that most Hindu scientists are employed in India. It is therefore interesting to look at the India effect across Models 1 and 2. Namely, with or without religious traditions included in the model, scientists employed in India are no different than Turkish scientists, in terms of their attitudes toward the commercialization of science. Indeed, that suggests Indian scientists are among the most likely to agree commercialization harms knowledge. But in Model 2, even while controlling for country, the Hindu effect remains statistically significant and substantial. To scrutinize this another way, in Model 3, we drop all scientists employed in India from our analysis and just focus

Table 1 Weighted descriptive statistics (95% confidence intervals in parentheses). 2015 RASIC Survey Data

Variable (range[a])	France	Hong Kong	India	Italy	Taiwan	Turkey	UK	US
Commercialization harms knowledge (1, 5)	3.09 (2.96, 3.21)	2.85 (2.70, 3.01)	3.10 (3.01, 3.19)	2.79 (2.66, 2.93)	2.90 (2.76, 3.04)	3.27 (3.13, 3.41)	2.56 (2.46, 2.66)	2.74 (2.65, 2.82)
Relg. tradition								
Protestant	0.02 (0.01, 0.04)	0.12 (0.08, 0.18)	0.02 (0.01, 0.03)	0.01 (0.00, 0.02)	0.10 (0.07, 0.13)	No obs.	0.14 (0.11, 0.17)	0.11 (0.09, 0.13)
No religion	0.64 (0.60, 0.69)	0.64 (0.57,0.71)	0.06 (0.05, 0.08)	0.33 (0.29, 0.38)	0.39 (0.35, 0.44)	0.11 (0.09, 0.15)	0.63 (0.59, 0.67)	0.57 (0.54, 0.60)
Catholic	0.22 (0.18, 0.26)	0.05 (0.03, 0.10)	0.03 (0.02, 0.04)	0.56 (0.51, 0.60)	0.01 (0.00, 0.01)	No obs.	0.12 (0.09, 0.14)	0.09 (0.08 0.12)
Orthodox	0.01 (0.00, 0.02)	0.00 (0.00, 0.02)	0.00 (0.00, 0.01)	0.01 (0.00, 0.05)	No obs.	0.00 (0.00, 0.01)	0.03 (0.02, 0.05)	0.01 (0.01, 0.02)
Jew	0.01 (0.00, 0.03)	0.00 (0.00, 0.01)	No obs.	0.00 (0.00, 0.00)	No obs.	No obs.	0.01 (0.00, 0.02)	0.03 (0.02, 0.04)
Muslim	0.02 (0.01, 0.04)	0.01 (0.00, 0.02)	0.06 (0.05, 0.08)	0.02 (0.01, 0.04)	No obs.	0.73 (0.69, 0.77)	0.02 (0.01, 0.03)	0.02 (0.01, 0.03)
Hindu	0.00 (0.00, 0.01)	0.02 (0.00, 0.07)	0.79 (0.76, 0.81)	0.01 (0.00, 0.01)	No obs.	No obs.	0.02 (0.01, 0.03)	0.04 (0.03, 0.06)
Buddhist	0.00 (0.00, 0.01)	0.05 (0.03, 0.09)	0.01 (0.00, 0.02)	0.00 (0.00, 0.01)	0.17 (0.13, 0.21)	No obs.	0.00 (0.00, 0.01)	0.02 (0.01, 0.03)
Other	0.04 (0.02, 0.07)	0.03 (0.01, 0.05)	0.03 (0.03, 0.04)	0.03 (0.02, 0.05)	0.26 (0.22, 0.30)	0.02 (0.01, 0.03)	0.03 (0.02, 0.04)	0.05 (0.04, 0.06)
Refused	0.04 (0.03, 0.05)	0.08 (0.05, 0.12)	No obs.	0.03 (0.02, 0.05)	0.08 (0.05, 0.11)	0.13 (0.10, 0.17)	No obs.	0.05 (0.04, 0.07)
Religious person	0.14 (0.11, 0.17)	0.34 (0.27, 0.41)	0.59 (0.56, 0.62)	0.49 (0.45, 0.54)	0.49 (0.44, 0.54)	0.43 (0.38, 0.47)	0.27 (0.24, 0.31)	0.29 (0.26, 0.32)
Attend	0.05 (0.03, 0.07)	0.13 (0.09, 0.19)	0.31 (0.28, 0.34)	0.26 (0.22, 0.30)	0.16 (0.13, 0.20)	0.26 (0.23, 0.30)	0.11 (0.09, 0.14)	0.16 (0.14, 0.19)
Belief in God	0.10 (0.08, 0.14)	0.19 (0.14, 0.24)	0.35 (0.32, 0.38)	0.35 (0.31, 0.40)	0.31 (0.27, 0.36)	0.53 (0.48, 0.58)	0.19 (0.16, 0.23)	0.19 (0.17, 0.22)
Patent holder	0.25 (0.20,0.30)	0.28 (0.22,0.35)	0.11 (0.10, 0.13)	0.13 (0.11, 0.16)	0.22 (0.19, 0.26)	0.04 (0.03, 0.06)	0.14 (0.11, 0.17)	0.13 (0.11, 0.15)
Biologist	0.38 (0.34,0.43)	0.53 (0.45,0.60)	0.56 (0.52, 0.59)	0.43 (0.38, 0.47)	0.68 (0.64, 0.72)	0.56 (0.52, 0.61)	0.69 (0.66, 0.72)	0.66 (0.63, 0.69)
Elite institution	1.00	1.00 (.99, 1.00)	0.44 (0.41, 0.47)	0.55 (0.51, 0.60)	0.73 (0.69, 0.87)	0.52 (0.47, 0.57)	0.81 (0.79, 0.84)	0.41 (0.38, 0.44)
Tenured	0.87 (0.84,0.90)	0.26 (0.21,0.32)	0.34 (0.31, 0.37)	0.56 (0.51, 0.61)	0.33 (0.29, 0.38)	0.56 (0.51, 0.61)	0.24 (0.21, 0.27)	0.28 (0.25, 0.30)
High research funding	0.22 (0.18,0.27)	0.17 (0.13,0.24)	0.22 (0.20, 0.25)	0.14 (0.11, 0.18)	0.23 (0.19, 0.27)	0.12 (0.09, 0.15)	0.19 (0.16, 0.23)	0.21 (0.18, 0.24)
More publications	0.39 (0.34,0.44)	0.31 (0.25,0.37)	0.20 (0.18, 0.23)	0.37 (0.33, 0.41)	0.28 (0.25, 0.32)	0.24 (0.20, 0.28)	0.29 (0.26, 0.33)	0.28 (0.26, 0.31)
Female	0.26 (0.23,0.30)	0.22 (0.15,0.30)	0.34 (0.31,0.38)	0.34 (0.30, 0.38)	0.28 (0.24, 0.33)	0.27 (0.23, 0.31)	0.38 (0.34,0.42)	0.29 (0.26,0.32)
More income	0.42 (0.36,0.47)	0.38 (0.31,0.46)	0.36 (0.33, 0.39)	0.30 (0.26, 0.35)	0.25 (0.21, 0.28)	0.59 (0.54, 0.63)	0.36 (0.32, 0.40)	0.32 (0.29, 0.35)
Political conservative	0.11 (0.09, 0.14)	0.39 (0.32, 0.47)	0.34 (0.31, 0.37)	0.14 (0.11, 0.18)	0.32 (0.28, 0.37)	0.23 (0.19, 0.28)	0.19 (0.16, 0.22)	0.15 (0.13, 0.17)
N (% of sample)	779 (8)	326 (4)	1606 (17)	1411 (15)	892 (10)	684 (7)	1531 (17)	1989 (22)

[a]The range of values for each variable is (0,1) unless otherwise noted

Table 2 Multivariate regression of commercialization harms knowledge. 2015 RASIC Survey Data

	M1 Ordered logistic	M2 Ordered logistic	M3[a] Ordered logistic	M4[b] Logit
Religious tradition				
Protestant (ref.)		–	–	–
No religion		1.60*	1.63*	1.57*
Catholic		0.96	0.98	1.13
Orthodox		1.53	1.52	1.83
Jew		1.18	1.23	1.32
Muslim		1.46	1.48	1.54
Hindu		2.26**	2.84**	2.46***
Buddhist		1.55	1.60	1.40
Other		1.17	1.15	0.92
Refused question		1.23	1.16	0.14***
Region				
France	0.84	0.97	2.19***	0.81
Hong Kong	0.72	0.79	1.75***	0.52
India	0.92	0.68	–	0.71
Italy	0.54***	0.68	1.49*	0.73
Taiwan	0.72	0.79	–	0.86
Turkey	(ref)	(ref)	–	(ref)
UK	0.41***	0.47**	(ref)	0.47**
USA	0.50***	0.56*	1.20*	0.61
Religious person	0.84	0.95	0.91	1.00
Attend	0.92	1.04	1.01	0.94
Belief in God	1.14	1.28*	1.34	1.12
Patent holder	0.49***	0.49***	0.49***	0.65**
Biologist	1.01	1.03	1.03	1.15
Elite department	0.97	0.98	0.97	1.03
Tenured	1.09	1.13	1.07	1.25
High Research funding	0.82	0.82	0.81	0.88
More publications	1.05	1.06	1.05	0.99
Female	0.78**	0.79***	0.81*	0.64***
Income	1.04	1.04	1.05	1.09
Political conservative	0.79*	0.77**	0.74*	0.77*
N	8719	8719	5711	9218

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed test)

All results are calculated using Stata's complex survey design where department variable is set as the primary sampling unit (PSU). Results are also calculated with a weight that adjusts for the sampling design

[a]India dropped from analysis because it is the country where the majority of Hindus work. Taiwan and Turkey are also dropped because no Hindus in the sample work in those countries

[b]Logistic regression analysis of binary outcome. Sample size is larger because missing data on the dependent variable are coded as zero instead of dropped from analysis

on the remaining countries that have any Hindu scientists (i.e., France, Hong Kong, Italy, UK and the USA). In Model 3, we still observe a statistically significant Hindu effect. This means that even outside of India, Hindu scientists are unique in their attitudes toward science commercialization. In Model 3, the religious none effect also remains statistically significant.

Secondly, it is reasonable to treat our dependent variable as a binary outcome, as opposed to an ordinal outcome. In doing so, we are able to maintain about 5% of the original sample who were dropped from analysis because either they answered "don't know" to the question that operationalizes our dependent variable, or they refused to answer it. By analyzing a binary outcome, we feel justified in coding these respondents as zero instead of dropping them from analysis. Namely, for Model 4, *Commercialization Harms Knowledge* = 1 for scientists who somewhat agree or strongly agree that commercialization harms knowledge.

Commercialization Harms Knowledge = 0 for scientists who do not agree that commercialization harms knowledge. Using the same complex survey design that was used for ordered logistic regression analyses, logistic regression output confirms a statistically significant Hindu and religious none effect. We also find that those who refuse to answer the religious tradition question are much less likely than Protestants to agree that commercialization harms knowledge.[5]

Discussion and Conclusion

Religious Traditions and the Lack Thereof

As entrepreneurs continue to look for untapped market opportunities, they may find that some key stakeholders will resist their commercialization efforts. We examine the market excluding boundary work around science among scientists. Analyzing a sample of 8719 biologists and physicists from around the world, we find that scientists who are Hindu and have no religious tradition are more likely than Protestants to agree that commercialization of science harms a university's commitment to knowledge production.

We demonstrate the importance of religious traditions in helping shape stakeholders' market excluding boundary work. This study suggests that entrepreneurs of contested commodities should take into account the religious tradition (or lack thereof) of its key stakeholders and that contested commodities will be more accepted among Protestants than Hindus. Conversely, and contrary to our interpretation of existing literature on capitalism and Islam and Catholicism, we find no evidence to conclude that Muslim and Catholic scientists differ from Protestant scientists. This pushes researchers to more closely examine how various denominations within religious traditions address various aspects of capitalism. For example, just as Weber (1905 [2009]) isolated Calvinism as a branch of Protestantism that was particularly amenable to modern rational capitalism, so too particular Protestant denominations today may stand out in their support for commercialization. As businesses continue to globalize and interact with a wide range of stakeholders, they must become increasingly aware of this wide range of religious traditions and their various postures toward contested commodities.

A novel aspect of our study is our focus on a professional group that many believe to embody secular sensibilities. Indeed, scientists tend to be less religious on a variety of dimensions than their national populations (Ecklund 2010; Ecklund et al. 2016). In this way, our study provides a conservative test, of sorts, on whether religious tradition has an effect on market excluding boundary work. In other words, many assume religiosity is a relatively weak motivational force among scientists, which would lead one to believe religious tradition should have little impact on scientists' attitudes toward science commercialization. In this analysis, we find that particular religious traditions have a strong and substantial effect. This suggests religious traditions may even more strongly shape the market excluding boundary work of contested commodities among non-scientists, a promising avenue for future research.

There is a tendency among scholars who study "academic capitalism" to overwhelmingly focus on how professional characteristics of scientists (such as discipline or rank) or their universities enable and constrain commercialization, to the neglect of socializing influences outside of science that may nevertheless impact a scientist's support for, or rejection of, commercial practices. Surprisingly, despite the irreligious characteristics of many in the science community, this study demonstrates that one cannot fully understand the market dynamics in science without understanding the religious tradition of scientists. This underscores a key contribution of this article; seemingly unrelated cultural factors (e.g., religious tradition) can have an important influence on market processes.

While the main thrust of this article shows that religious traditions represent important cultural forces that shape market excluding boundary work, we also find that the *lack* of religious tradition is important. Indeed, many scientists we analyze are *not* religious (i.e., they choose the survey answer category, "I don't belong to a religion."). These irreligious scientists are substantially more likely than Protestants to agree that commercialization harms knowledge. Put another way, in terms of attitudes toward commercialization, Hindus and religious nones are quite similar. Future studies on religion and business should therefore carefully consider the *irreligious* postures of stakeholders (e.g., atheism) and not assume that the moral motivational forces thought to exist among religious actors are absent among the non-religious.

Implications for Business Ethics

Of course, the specific business venture will strongly determine stakeholders' market excluding boundary work (Brennan and Jaworski 2015a). Namely, if a particular activity (e.g., sex with a stranger) is deemed immoral, then commercializing that activity (i.e., prostitution) would also unsurprisingly be deemed inappropriate. This article, however, applies to a more interesting range of phenomena that is not unilaterally prohibited outside of market exchange relations.

[5] Additional bivariate analysis reveals this is merely an artifact of the tendency of some scientists to refuse to answer both questions that we use to operationalize our key variables. In other words, of the 296 scientists we initially dropped because they refused to answer the question about science commercialization, 288 also refused to answer the religious tradition question.

Since these kinds of activities may accomplish ethical ends (e.g., organ and blood transactions), entrepreneurs may be surprised to find societal resistance to their market entry attempts into such domains. The attitudes of scientists toward science commercialization are a good example of this kind of phenomena because scientists are obviously not averse to scientific research in and of itself.

Contested commodities and the market excluding boundary work of key stakeholders is an important and understudied area of empirical research for business ethicists. With some exceptions (Bowie 1994; Herder and Brian 2007; Williams-Jones and Ozdemir 2007), business ethicists tend to take the presence of market activity for granted and instead focus on the ethical issues of actors already operating in that market. While we do not offer a direct ethical appraisal of science commercialization in this article (we instead descriptively focus on the attitudes of scientists themselves), we welcome more scholarship in this vein. Certainly business ethicists should weigh in on the moral limits of the market and more clearly justify whether a focus on Corporate Social Responsibility or ethical leadership in such markets obviate the concerns of those opposed to market entry to begin with. Beyond science commercialization, there are other business ethics topics to consider. Should there be a market for the right of corporations to pollute (i.e., carbon cap and trade)? How easily should e-commerce businesses be able to sell the private data of their consumers? Should market mechanisms be unflinchingly applied to poverty amelioration efforts around the globe? Should for-profit businesses play a role in solving every social problem? Descriptive research, like this article, on such topics will offer insightful empirical data to help us more fully understand which stakeholders draw symbolic boundaries around contested commodities.

Limitations

There are limitations to our study worth noting. This is an important first step in exploring religiosity and commercialization in a cross-national setting. Past research has delved deeply into how scientists' attitudes toward commercialization are shaped by characteristics of the organizations in which they work and their views about the relationship between science and the market. This work shows that values not apparently related to science do indeed matter for attitudes toward commercialization. However, our use of a single-item survey measure may create a conservative estimate of discomfort with commercialization and does not offer the nuance of previous research. Better survey measures and open-ended qualitative research on the relationship between religion and commercialization would allow important steps toward are more nuanced understanding of these views.

Second, to generate our religious tradition hypothesis, we focus on religious traditions and their various relationships to capitalism. This highlights the problems associated with an essentialist approach to a religious tradition which tends to assume homogeneity within a religious tradition (Dreher 2015). Indeed, within each religious tradition there are varied denominational groups with varied approaches to capitalism and there are a variety of capitalisms (Hall and Soskice 2001). We justify our approach, however, because of the lack of existing literature on religious traditions and attitudes toward contested commodities and because profit orientation is a key component of both capitalism and the commercialization of science. We welcome more nuanced accounts of both religious tradition and capitalism in future research.

Third, we recognize there are a variety of reasons stakeholders might engage in market excluding boundary work and we welcome future research that aims to better understand the reasons individual stakeholders give for their market excluding boundary work. In the case of science commercialization, existing literature suggests scientists resist commercialization as a result of concerns regarding conflicts of interest, bias and secrecy, as well as perceptions that knowledge is a public, rather than a private good (Bok 2003; Krimsky 2003; Mirowski 2011). But what precisely is it about Hindu scientists and scientists who don't belong to any religious tradition that lead them to see more harm in science commercialization than Protestants? We hope future researchers will more closely examine various kinds of market excluding boundary work among various stakeholder groups.

Lastly, while we think the regions included in our data set provide ample variance on our key religious tradition dimension, we realize there are many countries not included. This means generalizations to all scientists are inappropriate, and we welcome further research on science commercialization around the globe.

Despite these limitations, our results demonstrate that the religious tradition (or lack thereof) of scientists helps explain variance in their attitudes toward the commercialization of science. This is not only important because scholars rarely consider social institutions other than science when examining attitudes toward commercialization, it is important in demonstrating the role of culture when considering contested commodities. In order to better understand the market excluding boundary work stakeholders engage in around contested commodities, future research must consider the religious tradition, and more generally, the cultural values of key stakeholders.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no competing interests.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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