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Do markets overcome repugnance? Muslim trade response to anti-Muhammad cartoons

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ABSTRACT

What is the effect of religious beliefs on economic choices? And in light of this effect, what is the cost of free speech? After Danish newspapers published anti-Muhammad cartoons, the religious status of trade with Denmark changed exogenously in Muslim countries. Exports from Denmark to Muslim countries decreased by 31%, while close substitute countries like Finland gained export share. Final goods were more affected than intermediate goods, as were more religious Muslim countries. Denmark did not shift exports to other countries, but trade quantity rebounded in 20 months. Notably, Muslim exports to Denmark were unaffected, which is consistent with money overcoming repugnance.

1. Introduction

Proponents of the *doux commerce* thesis have argued that a competitive market, with its disruptive effect on geographical and tribal isolation, will increase our care for and understanding of others–"wherever there is commerce, manners are gentle," wrote Montesquieu (1749), and "commerce operates to cordialize mankind," according to Paine (1792). Consistent with this view, theoretical models have formalized the dynamics of market integration and preference evolution (Olivier et al., 2008), and cultural convergence (Maystre et al., 2014).[2] In particular, the causation runs in both ways: cultural distance affects trade (Atkin 2013); conversely, trade reduces cultural distance (Cyrus, 2012).

I examine the causal channel in the short- and medium-term; namely, the effect of the publication of anti-Muhammad cartoons by the Danish newspaper *Jyllands-Posten* on 30 September 2005. In most Islamic traditions, the act of making a picture, or any other form

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[2] Using World Value Survey data, the authors observe significant time variation in bilateral cultural distances over their sample period, but with a general pattern towards convergence. These time variations in bilateral cultural distances are correlated with variations in bilateral trade flows, which is consistent with the model.

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of likeness, of Muhammad is considered blasphemy. Thus, the publication of those cartoons was religiously significant from an Islamic perspective, but not from other people's perspective. The Danish government was also implicated, when it refused a request by eleven ambassadors from Muslim-majority countries to punish the publishers of the cartoons. I compare the reaction to these cartoons by Muslim and non-Muslim countries in their economic interactions with Denmark. The difference in this reaction is only due to an Islamic view of blasphemy, and therefore allows me to measure the effect that a difference in Islamic beliefs has on economic choice. The economic interaction of focal interest is international trade. I use monthly product-level data on trade of the 28 members of the European Union (EU) with the rest of the world.

To highlight the results: After Danish newspapers published anti-Muhammad cartoons, exports from Denmark to Muslim countries decreased by 31% for 20 months, but re- bounded by 36% thereafter. More secular Muslim countries were less affected by the controversy. Final goods (food, transport, and manufactured goods) were more affected, while intermediate goods (crude materials and commodities exports) were unaffected. The rebound virtually eliminated Muslim backlash. Interestingly, throughout this time period, Islamic exports to Denmark were unaffected (Danish money was acceptable). On the extensive margin—the number of product categories trading shows weaker evidence of a rebound. The weaker rebound on the extensive margin is consistent with fixed costs to trade (Melitz, 2003).

The idea that religious beliefs have economic consequences is associated with (Weber, 2002) classic work. However, identifying the effect of religion on economic choices has turned out to be rather difficult. In an ideal experimental setting, one would like to exogenously change people's religion, and look at the effect that such a change has on their economic choices. This paper looks at the context of Islam's effect on economic choices. In 1910, 13% of world population was Muslim. A century later, in 2010, the share of Muslims in world population has increased to 23%, or about 1.6 billion people. In light of the spread of Islam in the past century, understanding its effect on economic choices is of independent interest. To investigate the effect of Islam on economic choices, the paper focuses on an act that was only prohibited by Islam, and investigates how this act affects Muslims' economic interactions. The difference in the reaction of Muslims and non-Muslims to the same act is only due to the way Islam views the act, and therefore allows me to investigate and analyze the effect of Islam on at least one set of economic choices.

In regards to the link between religion and economic choices more broadly, some have tried to address this question by looking across countries (Grier, 1997; La Porta et al., 1997; Inglehart and Abramson, 1999; Stulz and Williamson, 2003; Barro et al., 2003). The problem with this approach, of course, is that the impact of religion is confounded with that of other institutional and cultural factors that vary across countries. Others have used an instrumental variables approach to overcome this issue (Becker and Woessmann, 2009), while still others have attempted to overcome it by looking at the relationship between intensity of religious beliefs and economic attitudes within countries (Guiso et al., 2003), or by studying the impact of Ramadan fasting on economic outcomes (Campante and Yanagizawa-Drott, 2015).

The econometric model also builds on the gravity equation of international trade, the workhorse for statistical analyses of trade flows. Here, I exploit a clear and arguably exogenous demand shifter in a gravity context. As such, this paper is also related to Michaels and Zhi (2010), who analyze consumer reactions to U.S.–France tensions over the Iraq invasion in 2003; Fuchs and Klann (2013), who examine whether political compliance is a precondition for healthy trade relations with China; and Heilmann (2016), who looks into the short-term effects of a number of consumer boycotts, including the Danish cartoon crisis. In contrast to these papers, I document an asymmetry in the effects: namely the null effect on Danish imports from Muslim countries, as well as the effect on Danish exports being visible only for final goods. Michaels and Zhi (2010) document a symmetric effect for final and intermediate goods. Fuchs and Klann (2013) find that their trade effect is driven by reduced exports of machinery and transport equipment and do not analyze exports from China. My interpretation, as suggested by the paper title, is that the null effect on exports from Muslim countries to Denmark is maybe because it was monetarily beneficial for Muslim countries. Moreover, final goods are observable to the common person in the population.

Finally, I contribute to a literature on the economic impacts of free speech. Chen and Yeh (2016) examine the causal effects of free speech rights in the U.S. This paper examines the economic effects of a speech act, specifically speech that is offensive to Muslims. The data also allow a long-term and heterogeneous effects perspective for studying mechanisms. In particular, I note the willingness of Islamic countries to accept money despite the boycott. The remainder of the paper is organized as follows. Section 2 describes the context, data, and specifications. Section 3 presents the results. Section 4 examines heterogeneity. Section 5 concludes.

2. Setting, data, and empirical strategy

2.1. The Danish cartoons

On 30 September 2005 the Danish newspaper *Jyllands- Posten* published 12 editorial cartoons, most of which depicted the prophet Muhammad. In the following days, the cartoons received significant attention in other Danish press outlets.

Following petitions from Danish imams, on 12 October 2005, eleven ambassadors from Muslim-majority countries (Turkey, Saudi Arabia, Iran, Pakistan, Egypt, Indonesia, Algeria, Bosnia and Herzegovina, Libya, and Morocco), and the Head of the Palestinian General Delegation, asked for a meeting with Danish Prime Minister Anders Fogh Rasmussen. Their letter noted an "on-going smearing campaign in Danish public circles and media against Islam and Muslims," and asked for the Danish Government "to take all those responsible to task under law of the land in the interest of inter-faith harmony, better integration and Denmark's overall relations with the Muslim world."

The Danish Prime Minister answered with a letter, without addressing the request for a meeting. He noted that "The freedom of expression has a wide scope and the Danish government has no means of influencing the press. However, Danish legislation prohibits

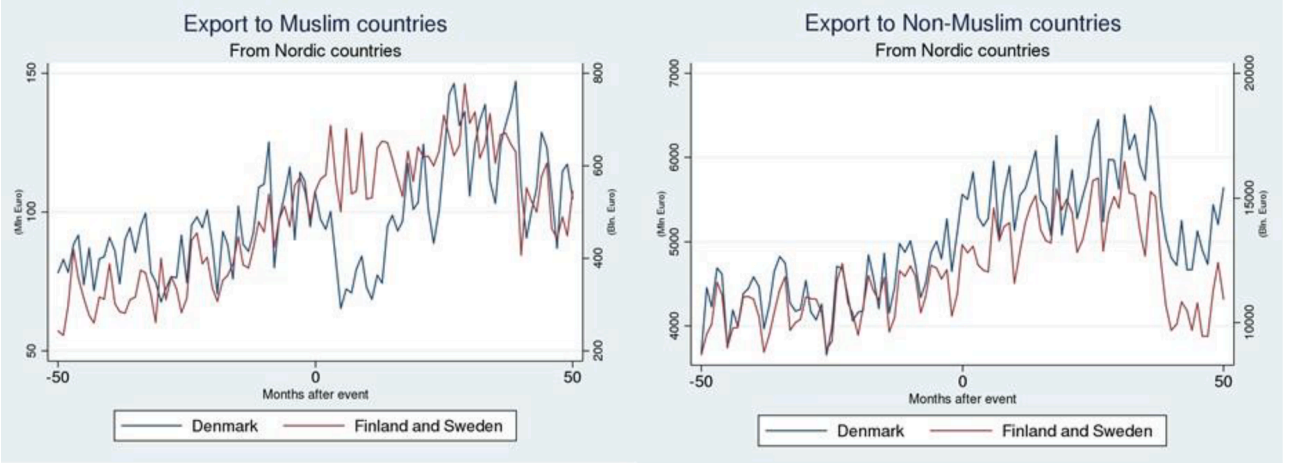

Fig. 1. Export to Muslim and Non-Muslim countries by Denmark vs. Finland and Sweden.

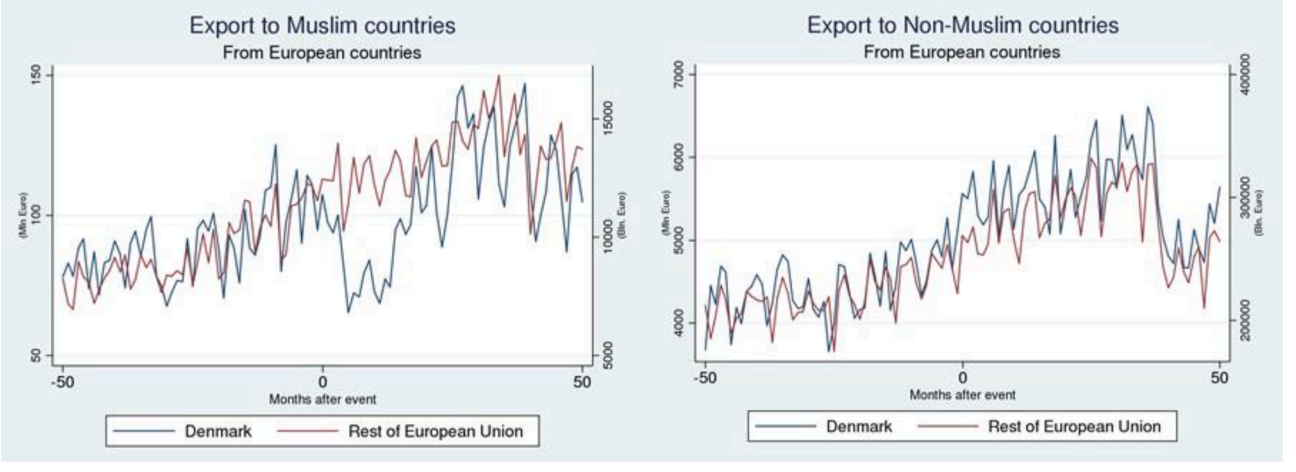

Fig. 2. Event Study Analysis of Export to Muslim and Non-Muslim countries by Denmark vs. the rest of the EU.

acts or expressions of blasphemous or discriminatory nature. The offended party may bring such acts or expressions to court, and it is for the courts to decide in individual cases."

The Organization of Islamic Cooperation (OIC) and Arab League also wrote a joint letter to the Prime Minister expressing alarm about the cartoons. Turkish Prime Minister Recep Tayyip Erdoğan visited Copenhagen in November, and clashed with Rasmussen over the cartoons. Egyptian foreign minister Ahmed Aboul Gheit and the secretary- generals of the OIC and the Arab League sent letters to the OSCE, OECD, and EU foreign policy coordinator complaining about Danish inaction.

In December 2005, a group of Danish Muslim clerics decided to gain support and leverage outside of Denmark by meeting directly with religious and political leaders in the Middle East. They prepared a 43-page document which was circulated on visits to Egypt, Syria and Lebanon in early December 2005. The dossier was also distributed informally on 7–8 December 2005 at the OIC summit in Mecca, with many heads of state in attendance. Violent demonstrations and riots occurred in January and February 2006.

A 2006 Pew Global Attitudes survey found that most people in Muslim countries had heard of the cartoons (Egypt 98%, Jordan 99%, Pakistan 87%, Turkey 89%). Most placed sole blame on Western nations' disrespect for Islamic religion (Egypt 87%, Jordan 90%, Turkey 84%). In contrast, many individuals in non-Muslim countries blamed Muslims' intolerance to different points of view (Germany 62%, France 67%, US 60%). Media and word-of-mouth played key roles in information transmission.

While many economic models suggest that economic agents make trading decisions based only on the inherent price and quality of goods and services, attitudes can exert additional influence on economic decisions.

2.2. Data and raw visualizations

I investigate the effect that the publication of the Danish cartoons had on international trade. To do so, I use Eurostat monthly data on the trade of the 28 members of the EU with the rest of the world. The data uses the Standard International Trade Classification (SITC), and allows for three levels of data aggregation (total exports, exports by 1-digit SITC code, and exports by 2-digits SITC code). Additionally, I use country-level Religion Adherence Data (McCleary and Barro, 2006a, b).

I begin with visual displays of the raw data. In Fig. 1, I present the exports of Denmark, Sweden, and Finland to Muslim and non-Muslim countries. Time zero on the x-axis represents September 2005, the month in which the cartoons were published. As one can see on the left panel of Fig. 1, relative to Swedish and Finnish exports to Muslim countries, Danish exports to Muslim countries collapsed after the publication of the cartoons, and picked up again around 20 months after the publication. These findings are especially clear when one compares the left panel in Fig. 1 to the right panel, which presents data on exports to non-Muslim countries. In the right panel, there is no effect of the publication of cartoons on Danish exports to non-Muslim countries relative to Swedish and Finnish exports.

In Fig. 2, I present data on exports of Denmark versus the rest of the EU, to Muslim and non-Muslim countries. Again, one can see on the left panel of Fig. 2 that, relative to the exports by EU countries to Muslim countries, Danish exports to Muslim countries collapsed after the publication of the cartoons, and picked up again around 20 months after the publication. These findings are also especially clear when one compares them to the right panel of Fig. 2, which presents data on exports to non-Muslim countries. Again, in the right panel, there is no effect of the publication of cartoons on Danish exports to non-Muslim countries, relative to European Union exports.

These figures motivate the inclusion of a dummy indicator for the first 20 months after the publication of the cartoons, and another one for the following period, to capture the drop and rebound, respectively. Recall Fig. 1 showed no pre-trend before the event, which was in any event unexpected, so we can interpret the estimates as causal. Fig. 3 displays an additional motivating chart that illustrates

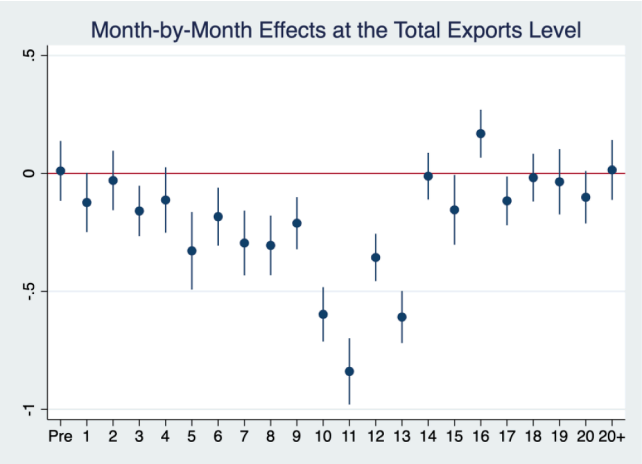

Fig. 3. Export to Muslim and Non-Muslim countries by Denmark vs. the rest of the EU.
Each dot represents a separate coefficient for exports differing for Danish exports to Muslim countries for every month after the event along with their respective confidence intervals. The Pre period is prior to month 0. The omitted category is the month of the event. The average amount of exports at the source-destination level is residualized. The regression is a log-linear model with zero values being treated as 1.

distinct coefficients for total exports, highlighting the differences between Danish exports to Muslim countries on a monthly basis, complete with confidence intervals.

2.3. Empirical strategy

The empirical strategy follows a differences-in-differences research design. The specification is:

$$Y_{ictp} = \alpha + \beta_1 \times PostCartoon_t \times Denmark_i \times Muslim_c + \beta_2 \times PostBlowback_t \times Denmark_i \times Muslim_c + \gamma_{icp} + \delta_{ipt} + \eta_{cpt} + \varepsilon_{ict}$$

The dependent variable, Y_{ict}, is a measure of exports from country i to country c, at time t, for product p. $PostCartoon_t$ is a dummy indicator that assumes the value one after the publication of the cartoons ($t > 0$), $PostBlowback_t$ is a dummy indicator that assumes the value one after the resolution of blowback ($t > 20$), $Denmark_i$ is a dummy indicator that assumes the value one when the exporting country is Denmark, and $Muslim_c$ is a dummy indicator that assumes the value one when the importing country is Muslim, which is defined as a country in which at least 80% of the population is Muslim. For specifications at the product level, γ_{icp} represent fixed effects for source i, destination c, and product p, δ_{ipt} represent source-product-month-year fixed effects, and η_{cpt} represent destination-product-month-year fixed effects. The specification after aggregating trade flows at the source-destination-time level includes source-destination fixed effects, source-month-year fixed effects, and destination-month-year fixed effects. I cluster standard errors at source, destination, and year levels (three-way clustering).

I present estimates using Poisson pseudo-maximum likelihood (PPML) estimator that takes into account the information contained in the zero trade flows and to address the inconsistency issue caused by heteroskedasticity in levels. In the appendix, I present log-linear models where zero values are treated as 1. PPML estimates the total margin while the log-linear model estimates the intensive and total margin separately. I also consider the extensive margin using a linear probability model (Angrist and Pischke, 2008).

Some specifications restrict to Scandinavian countries to keep the set of countries serving as "control" closer to Denmark. The number of trading partners is 184, the number of months is 168, and the number of product categories is 1, 10, or 100, depending on the level of aggregation. I present analyses at three levels of data aggregation–(i) total exports, (ii) exports by 1-digit SITC code, and (iii) exports by 2-digits SITC code.

Heterogeneity analyses are presented at the 2-digit level because heterogeneity analyses employ 2-digit level product classifications to see, for example, how final goods or intermediate goods trade responded relative to capital goods. These estimates include source-destination fixed effects and source-destination-time fixed effects. To be computationally feasible, two-digit analyses group the time fixed effects into three time blocks - $PostCartoon_t$, $PostBlowback_t$, and pre-period - and then interacts these time blocks to create source-product-time fixed effects and destination-product-time fixed effects.

3. Results

3.1. Main model

3.1.1. Intensive margin

In Table 1, the dependent variable is total exports. Column (1) uses the entire sample, while Column (2) uses the Scandinavian sample. To interpret the results, Column (1) indicates that Danish exports to Muslim countries decreased by 31% in the first 20 months following the publication, and following those months exports increased by 36%. Compared with other Scandinavian countries, Danish exports dropped by 47% in the first 20 months following the publication, while following those months exports increased by 44%. This

Table 1
Total exports level.
Model estimated with Poisson pseudo-maximum likelihood on the total exports level. Column 1 presents the entire sample, while column 2 presents the Scandinavian sample. Month>0 and Month>20 are dummies indicating the period after September 2005 (when cartoons were published) and May 2007 (20 months after publication), respectively. Denmark X Muslim represents the interaction of the dummies for Danish exports to Muslim countries. Regression includes source-destination fixed effects, source-month-year fixed effects, and destination-month-year fixed effects. Standard errors are clustered at source, destination, and year level.

	Base model	North sample
Denmark X Muslim ($t > 0$)	−0.313***	−0.472***
	(0.0228)	(0.147)
Denmark X Muslim ($t > 20$)	0.357***	0.439***
	(0.0255)	(0.157)
Observations	845,188	90,153
P-value ($t > 0$)	5.95e-43	0.0013751
P-value ($t > 0 + t > 20$)	0.192	0.651

Standard errors in parentheses.
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

pattern is consistent with what we see in the figures.

The dependent variable in Table 2 is exports by 1-digit SITC code and in Table 3 is exports by 2-digit SITC code. Column (1) uses the baseline specification with the entire sample and Column (2) uses the Scandinavian sample. In Table 2, Danish exports to Muslim countries decreased by 23% in the first 20 months following the publication, and following those months exports increased by 31%. In Table 3, Danish exports to Muslim countries decreased by 21% in the first 20 months following the publication, and following those months exports increased by 39%. These specifications show a typically significant drop in exports following the cartoon publication, which is subsequently followed by a rebound. In Table 3, the rebound is a bit larger relative to the original drop. The appendix reports estimates using log-linear models with 0 s dropped. The estimates paint a broad picture of a significant drop and significant rebound, whether the analysis is conducted at the total exports, 1-digit, or 2-digit levels. The log-linear models find a rebound that can be somewhat smaller than the initial drop. The results are presented in Appendix Tables IX, X, and XI.

3.1.2. Extensive margin

Table 4 reports an analysis of the impact on the extensive margin. Column (1) uses the entire sample, while Column (2) uses the Scandinavian sample. To interpret the results, Column (1) indicates that Danish exports to Muslim countries decreased by 4% along the extensive margin in the first 20 months following the publication, while following those months, exports increased by 1%. The results for the Scandinavian sample is not statistically significant in either the drop or rebound, but the magnitudes are comparable with the entire sample.

Table 5 examines exports by 1-digit SITC code on the extensive margin. Column (1) uses the entire sample as control for Danish exports. Notably, these results show no rebound. The drop in exports remains statistically significantly negative throughout the time frame. A 1% drop in the relative number of Danish products exported is followed by another 1% decline.

In Table 6, the dependent variable is number of exports by 2-digit SITC code. The results confirm the previous result that as trade is examined more granularly, the picture changes from a rebound that eliminates the initial decline to one where the decline is persistent. However, neither coefficient is statistically significant.

3.1.3. Overall margin

The online appendix presents analyses using a log-linear model. Mechanically, this means that the trade data is calculated as a log of 1+ the underlying value, and missing values are set to 0. In the respective intensive margin analysis, missing values are dropped. This renders a change of 20% in sample size even at the total exports level (and a 70% change in sample size for the 2-digit level). The results are presented in Appendix Tables XII, XIII, and XIV.

The level of aggregation renders significant differences in the magnitude of the impact, but not in the qualitative interpretation. For example, Table XII shows that exports declined by 61% (or 74%) relative to the control group, and the rebound did not redress the initial decline. The long-term effect remains significantly negative for the total exports level and for the 1-digit level, and is negative, but not significantly so, for the 2-digit level. At the 2-digit level, the measured decline in exports is 9% (or 15%) relative to the control group. As the change in sample size suggests, part of the reason the results differ so much from the intensive margin analysis is that there are many product categories without trade. Accounting for this fact renders a different picture of a rebound that redresses the decline.

3.2. Muslim population shares

The basic specification used a dummy indicator for Muslim countries, defining a country as Muslim if at least 80% of its population is Muslim. Instead, Table 7 uses the population share of Muslim (and revisits the intensive margin). The original results of a decline in

Table 2
Exports at the 1-digit level.
Model estimated with Poisson pseudo-maximum likelihood on the 1-digit level. Column 1 presents the entire sample, while column 2 presents the Scandinavian sample. Month>0 and Month>20 are dummies indicating the period after September 2005 (when cartoons were published) and May 2007 (20 months after publication), respectively. Denmark X Muslim represents the interaction of the dummies for Danish exports to Muslim countries. Regression includes source-destination-product fixed effects, source-product-month-year fixed effects, and destination-product-month-year fixed effects. Standard errors are clustered at source, destination, and year level.

	Base model	North sample
Denmark X Muslim ($t > 0$)	−0.226***	−0.326***
	(0.0223)	(0.0789)
Denmark X Muslim ($t > 20$)	0.311***	0.314***
	(0.0280)	(0.0742)
Observations	7,098,947	610,116
P-value ($t > 0$)	5.68e-24	0.0000356
P-value ($t > 0 + t > 20$)	0.002	0.880

Standard errors in parentheses.
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table 3
Exports at the 2-digit level.
Model estimated with Poisson pseudo-maximum likelihood on the 2-digit level. Column 1 presents the entire sample, while Column 2 presents the Scandinavian sample. Month>0 and Month>20 are dummies indicating the period after September 2005 (when cartoons were published) and May 2007 (20 months after publication), respectively. Denmark X Muslim represents the interaction of the dummies for Danish exports to Muslim countries. Regression includes source-destination-product fixed effects, source-product-time fixed effects, and destination-product-time fixed effects. Standard errors are clustered at source, destination, and year level.

	Base model	North sample
Denmark X Muslim ($t > 0$)	−0.158***	−0.0996**
	(0.0338)	(0.0474)
Denmark X Muslim ($t > 20$)	0.313***	0.271***
	(0.0358)	(0.0624)
Observations	39,528,474	4,257,796
P-value ($t > 0$)	3.04e-06	0.0355275
P-value ($t > 0 + t > 20$)	0.002	0.019

Standard errors in parentheses.
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table 4
Extensive margin (total exports level).
Extensive margin model estimated with linear probability on the total exports level. Column 1 presents the entire sample, while column 2 presents the Scandinavian sample. Month>0 and Month>20 are dummies indicating the period after September 2005 (when cartoons were published) and May 2007 (20 months after publication), respectively. Denmark X Muslim represents the interaction of the dummies for Danish exports to Muslim countries. Regression includes source-destination fixed effects, source-month-year fixed effects, and destination-month-year fixed effects. Standard errors are clustered at source, destination, and year level.

	Base model	North sample
Muslim X Denmark ($t > 0$)	−0.0383***	−0.0266
	(0.00656)	(0.0121)
Muslim X Denmark ($t > 20$)	0.00913***	−0.00422
	(0.00256)	(0.00708)
Observations	860,832	92,232
P-value ($t > 0$)	0.0000584	0.1579243
P-value ($t > 0 + t > 20$)	0.001	0.181

Standard errors in parentheses.
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table 5
Extensive margin (1-digit level).
Extensive margin model estimated with linear probability on the 1-digit level. Column 1 presents the entire sample, while column 2 presents the Scandinavian sample. Month>0 and Month>20 are dummies indicating the period after September 2005 (when cartoons were published) and May 2007 (20 months after publication), respectively. Denmark X Muslim represents the interaction of the dummies for Danish exports to Muslim countries. Regression includes source-destination-product fixed effects, source-product-month-year fixed effects, and destination-product-month-year fixed effects. Standard errors are clustered at source, destination, and year level.

	Base model	North sample
Denmark X Muslim ($t > 0$)	−0.00959***	−0.0192
	(0.00309)	(0.0123)
Denmark X Muslim ($t > 20$)	−0.00768**	−0.00929
	(0.00310)	(0.0118)
Observations	8,608,320	922,320
P-value ($t > 0$)	0.0083261	0.1184398
P-value ($t > 0 + t > 20$)	0.003	0.035

Standard errors in parentheses.
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table 6
Extensive margin (2-digit level).
Extensive margin model estimated with linear probability on the 2-digit level. Column 1 presents the entire sample, while column 2 presents the Scandinavian sample. Month>0 and Month>20 are dummies indicating the period after September 2005 (when cartoons were published) and May 2007 (20 months after publication), respectively. Denmark X Muslim represents the interaction of the dummies for Danish exports to Muslim countries. Regression includes source-destination-product fixed effects, source-product-time fixed effects, and destination-product-time fixed effects. Standard errors are clustered at source, destination, and year level.

	Base model	North sample
Denmark X Muslim ($t > 0$)	−0.00259	−0.00460
	(0.00254)	(0.00578)
Denmark X Muslim ($t > 20$)	−0.00348	−0.00187
	(0.00345)	(0.00570)
Observations	61,119,072	6,548,472
P-value ($t > 0$)	0.326633	0.4259855
P-value ($t > 0 + t > 20$)	0.094	0.321

Standard errors in parentheses.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

exports following the publication of the cartoons followed by a rebound remains. The larger the country population share that is Muslim, the larger the impact of the publication of the cartoon. Appendix Table XV reports qualitatively similar findings using a log-linear model.

4. Heterogeneity across products

Thus far, the results show that—along the intensive margin—a drop and rebound that greatly reduced the Muslim backlash to the cartoons. However, on the extensive margin, the number of product categories trading did not rebound. Together, these results present a subtle picture of the costs of free speech.

This section introduces further nuances. Islamic exports to Denmark were unaffected (Danish money was acceptable) throughout this time period (relative to the controls) (Fig. 4).

In addition, final goods (food, transport, and manufactured goods) were more affected, while intermediate goods (crude materials and commodities exports) were unaffected. For readability, Fig. 5 presents the analysis in three time categories: before, during, and after. It shows more salient effects for final products like food, animals, and machinery. For transparency, the raw data is presented in the Appendix along with all product categories in Appendix Figure 6. The other product categories exhibit less salient effects. To examine this pattern more formally, the next analyses use regressions and existing indicators that classify categories into different types.

Tables 8, XVII, and XVIII present regression analyses where an index is used to group products into categories. Broda-Weinstein elasticities (Broda and Weinstein, 2006) and the Rauch index (Rauch, 1999) are frequently used in economic analyses because the Broda-Weinstein elasticities refer to the degree to which the demand for a good or service changes in response to changes in its price (i.e., the price elasticity of demand for a good) and the Rauch index refers to the degree to which a good is substitutable with another. It might be expected that goods that are typically elastic to price changes would also be elastic to the Danish cartoon shock. This analysis

Table 7
Interaction with Muslim population share.
Model estimated with Poisson pseudo-maximum likelihood on the total exports level. Column 1 presents the entire sample, while Column 2 presents the Scandinavian sample. Month>0 and Month>20 are dummies indicating the period after September 2005 (when cartoons were published) and May 2007 (20 months after publication), respectively. Denmark X Muslim represents the interaction of a dummy for Danish exports and the population share of the partner country that is Muslim. Regression includes source-destination fixed effects, source-month-year fixed effects, and destination-month-year fixed effects. Standard errors are clustered at source, destination, and year level.

	Base model	North sample
Muslim share X Denmark ($t > 0$)	−0.347***	−0.475***
	(0.0194)	(0.115)
Muslim share X Denmark ($t > 20$)	0.318***	0.470***
	(0.0258)	(0.103)
Observations	845,188	90,153
P-value ($t > 0$)	2.39e-71	0.0000387
P-value ($t > 0 + t > 20$)	0.372	0.962

Standard errors in parentheses.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

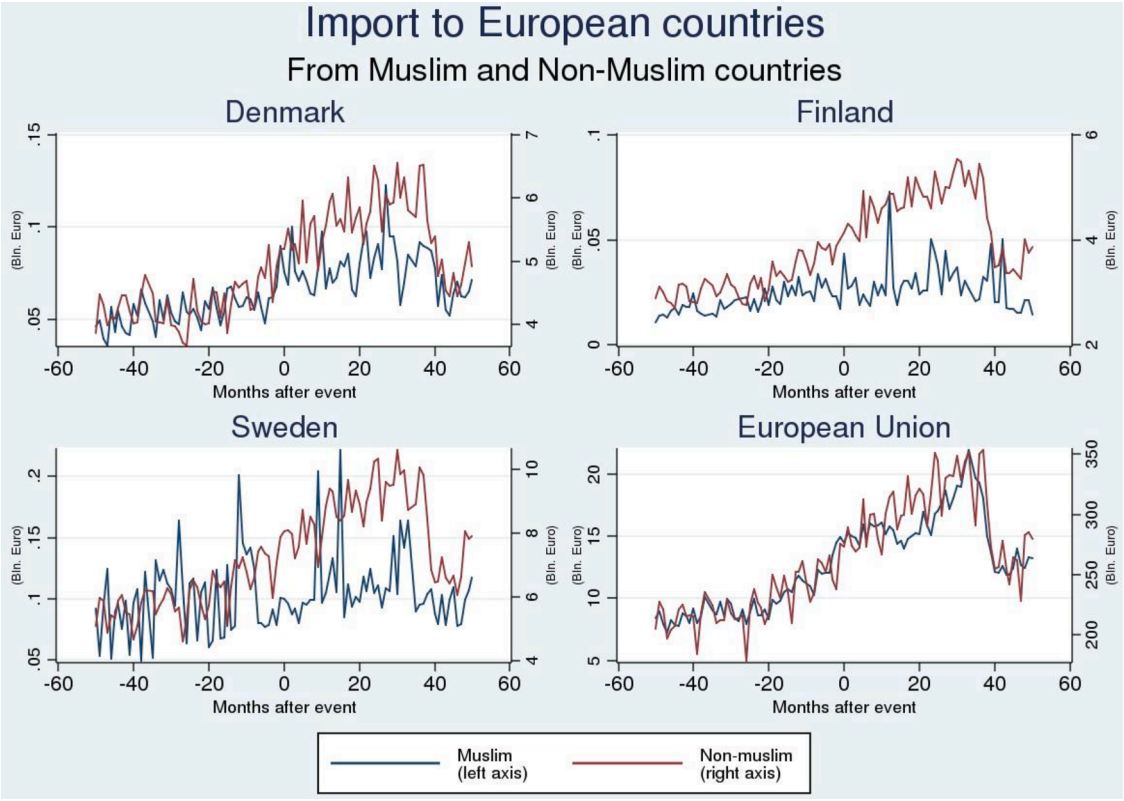

Fig. 4. Import from Muslim and Non-Muslim countries by Denmark vs. the rest of the EU.

is captured by Sigma in the tables. Higher values of Sigma mean that the product is more price elastic. The Rauch Index has lower values meaning a good is non-homogenous (not substitutable) while higher values mean a good is more homogenous (substitutable). It might be expected that goods that are more substitutable would also be more elastic to the Danish cartoon shock. Indeed, the results show that the higher the homogeneity, the higher the drop and subsequent rebound. This interpretation is consistent with an interpretation of greater substitutability rendering larger effects.

Table 8 shows significant differences by Broda-Weinstein elasticities and by the Rauch index. The greater elasticity of demand, the more impacted, according to the analyses using Broda Weinstein. The more substitutable is a good, the more impacted, according to the analyses using the Rauch index. A similar pattern is found for the extensive margin (Appendix Table XVII) though for the Rauch index a greater substitutability shows a more marked decline: we do not see a greater rebound for the more substitutable goods. Appendix Tables XVI and XVIII report analyses using a log-linear model with 0 s dropped or treated as 1 s. They show no significant differences by Broda-Weinstein elasticities for only the intensive margin, but significant differences for the overall margin in terms of decline and rebound. With the Rauch index, we see a more marked decline, but do not see a respective rebound.

5. Conclusion

This paper examines a shock on moral attitudes and the subsequent dynamic market response. The Danish newspaper *Jyllands-Posten*'s publication of Muhammad cartoons led to a substantial decrease in Danish exports to Muslim countries on the intensive margin. In addition, a larger response and rebound was observed for countries with greater Muslim share of population. However, the extensive and overall margin showed a more permanent effect. More substitutable products showed greater effect. But money (the most substitutable of all)—despite professed repugnance—showed no effect: there was no decrease in Danish imports from Muslim countries.

Data availability

Data will be made available on request.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.euroecorev.2023.104483.

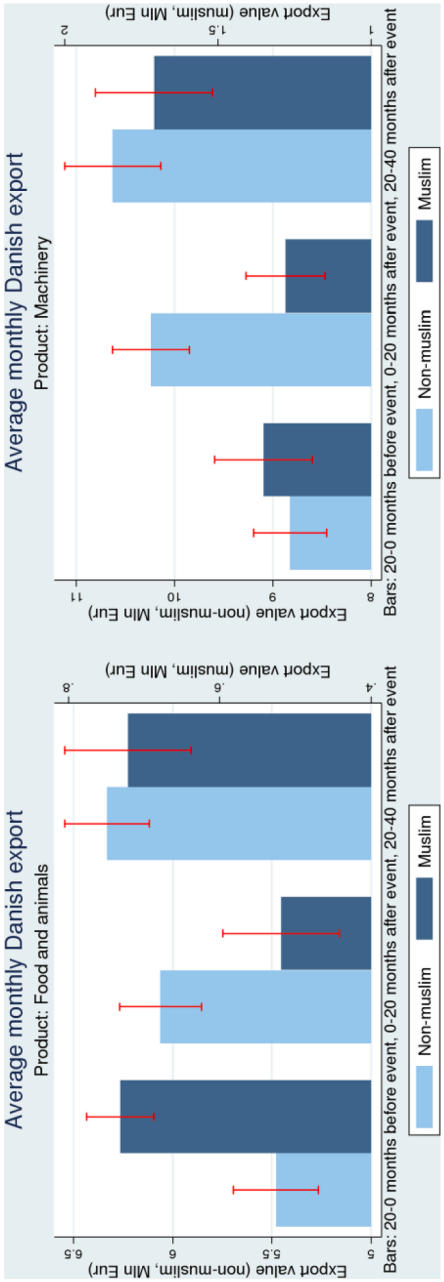

Fig. 5. Heterogeneity by product category.

Table 8
Heterogeneity analysis: Interaction with Rauch product category
Model estimated with Poisson pseudo-maximum likelihood on the 2-digit level. Each 2-digit SITC product category was assigned to its average Broda-Weinstein import elasticity (Column 1) or its average Rauch Classification Index (Column 2). Month>0 and Month>20 are dummies indicating the period after September 2005 (when cartoons were published) and May 2007 (20 months after publication), respectively. Denmark X Muslim represents the interaction of the dummies for Danish exports to Muslim countries. Regression includes source-destination-product fixed effects, source-destination-time fixed effects, source-product-time fixed effects, and destination-product-time fixed effects. Standard errors are clustered at source, destination, and year level.

	Sigma	Rauch
Muslim X Denmark X Sigma ($t > 0$)	−0.0292***	
	(0.00704)	
Muslim X Denmark X Sigma ($t > 20$)	0.0674***	
	(0.00492)	
Muslim X Denmark X Rauch ($t > 0$)		−0.268***
		(0.0254)
Muslim X Denmark X Rauch ($t > 20$)		0.349***
		(0.0488)
Observations	38,392,166	38,780,770

Standard errors in parentheses.
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

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