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Abstract:
We explore the economic impact of boycotts of French automobiles in China during the time of the 2008 Beijing Olympics. Conditions were favorable for a boycott, enabling Chinese consumers to overcome the collective action problems that can prevent boycott success and other voluntary contributions to public goods. We use brand and model level data in a difference-in-difference specification to investigate the boycotts' effects on sales. A robust pattern of large impacts emerges: sales of French automobile brands fell 25-33% or more. Consumers substituted mostly toward Chinese and other Asian cars. The sales of the French models did not experience similar relative sales declines in countries other than China—triple-difference estimates point toward even larger relative loss of market share in China. Our results provide evidence that commerce can be used as an effective political weapon.

JEL Codes: D12, H41, L62

Keywords: boycotting, voluntary contributions to a public good, economics of nationalism, free riding, Chinese automobile industry, vehicles, cars

1. Introduction

Attempts to boycott consumer products to protest a firm's business decisions or a country's political actions are frequent today. In the US, more than half of top brands have been boycotted.[1] Table 1 lists many recent calls for boycotts around the world, including some targeting a single product (e.g., Cheetos, for promoting vandalism in its advertising), others aimed at an entire industry (e.g., Canadian seafood, for killing seals in Canada), and still other directed against an entire nation's products (e.g., Scotland, for releasing the Lockerbie bomber). Despite the prevalence of boycotts, both economic theory (Baron, 2001)[2] and empirical examination of specific boycotts (Koku, Akhigbe, and Springer, 1997) suggest that a boycott is likely to fail in many cases (where "failure" means lack of participation by consumers). Thus, finding that the US boycott of French wines at the time of the invasion of Iraq was ineffective, Ashenfelter, Ciccarella, and Shatz (2007) ask in their subtitle, "Does politics really affect commerce?" Whether boycotts achieve their purposes has policy implications regarding the role of government versus private collective action, and, in particular, the use of commerce as a weapon. In this paper, we examine the economic impact of a recent episode that garnered inter-national attention: the boycotts of French products in China in the time surrounding the 2008 Beijing Olympic Games. In particular, we examine sales of French automobiles, and find that the boycotts significantly reduced the market share of French brands.

The boycott of French products in 2008 was in response to two incidents: the disruption of the Olympic torch relay in Paris in April and French President Nicolas Sarkozy's decision to meet with the Tibetan spiritual leader, the Dalai Lama, near the end of the year. Using difference-in-difference methodology and monthly brand level data on sales, we find that each

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[1] John and Klein (2003) cite statistics showing that 54% of top brands face calls for boycotts and that boycotts increased about fourfold from the 1980s to the 1990s.

[2] Baron (2001) shows that the mere threat of a boycott can lead to concessionary action by the firm, so that boycotts are not observed in equilibrium.

incident sparked a large, measureable decline in the market share of domestic produced French-branded automobiles. The data clearly reveal the general pattern of the boycott impacts, which is robust to many alternative specifications. In the first boycott of French automobiles, we find that the sales losses become larger as the Olympics approach, last only through the Olympics, and cause market share of the French brands to fall by about one-quarter (relative to trends affecting all brands) in the peak month. In the second boycott (in response to the Sarkozy-Dalai Lama meeting), the effects are even larger, with the market share of French automobiles falling by as much as one-third, but are of short duration. Estimations using sales instead of market share as the dependent variable, as well as an estimation using a matched sample of model level data (where individual French models are matched to non-French models with similar characteristics) yield substantially similar patterns but with even larger magnitudes.

We also explore the substitution behavior of consumers, since buyers are likely to switch to substitute brands of other origin when they boycott French automobiles. As would be expected given the circumstances of the boycott, the estimations show that buyers substitute toward Chinese and other Asian brands, not brands from other Western countries. Thus, it appears that the anger of Chinese consumers spilled over to other Western automobile brands. Finally, we investigate whether the French automaker's sales decline in China occurred in other countries as well, and find that it did not.

The present work contributes to three distinct strands of the economics literature: the empirical bodies of research that assess the impact of boycotts, examine contributions to public goods, and perform industry studies. Most of the earlier work on the financial impact of boycotts examines the stock prices of targeted firms. Results are mixed. Certain studies find that the valuation of a firm falls due to a boycott (Davidson, Worrell, and El-Jelly, 1995), sometimes even in response to its announcement (Pruitt and Friedman, 1986). Other studies find either no effect or anomalous positive effects of boycotts on stock prices (Koku, Akhigbe, and Springer,

1997; Teoh, Welch and Wazzan, 1999), or yield mixed evidence within the same study (Epstein and Schnietz, 2002).[3] These studies thus indicate that boycott success is highly variable.

There is also variability in the conclusions drawn on the success of a specific boycott. The three previous studies of boycott participation examining product-level sales look at the US consumer boycott of French wines in 2003 stemming from France's lack of support for the invasion of Iraq led by the US. Two of these papers find that, after controlling for other factors and trends, the boycott did not significantly reduces sales of French wines (Ashenfelter, Ciccarella, and Shatz, 2007; Bentzen and Smith, 2007), while Leslie and Chavis (2009) conclude that it did. The present work is the first econometric examination (of which we are aware) of a boycott with microdata on sales for a product other than wine.[4] Consequently, it is also the first to examine boycott success in terms of sales for a good that represents a major expenditure for most households.[5]

Participation in a boycott is a contribution to a public good (John and Klein, 2003). If the goal of the boycott is to cause the target to cease an "egregious act," then all consumers will benefit upon a boycott's success and can free ride. Not only are the benefits nonexclusive, they are also likely to be nonrival, as in the present case where the perceived benefits of the boycott come from asserting Chinese nationalism and self-determination on the world's stage. Nationalism itself is also a public good (Breton, 1964), in which individuals can invest through certain acts—boycotting French products, in the present case. Thus our paper contributes to the economic literature on voluntary contributions to public goods in general (Ostrom, 2000) and to nationalism in particular (Breton, 1964; Pagano, 1995). We are aware of little econometric work on the economics of nationalism, although study of the economic effects of nationalist boycotts

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[3] See Chavis and Leslie (2009) for further citations to the empirical boycott literature.
[4] In the other paper analyzing a boycott with sales data of which we are aware, Bentzen and Smith (2002) investigate how sales of French wine in Denmark declined at the time of a boycott in response to French nuclear weapons testing, but did not conduct econometric tests of the significance of their finding.
[5] Fershtman and Gandal (1998) also examine a boycott's effect on automobile sales, but in their case of the Arab economic boycott of Israel, consumer participation in the boycott was not at issue.

in China has a long history stemming from Orchard (1930) and Remer (1979), who examine boycotts in the pre-communist era. Closest in spirit to the present work is that of Michaels and Zhi (2010), who investigate the impact of anti-French political sentiments in the US in 2003 on the input purchasing decisions of US firms, and find that much of the 10-12% decrease in US-French trade was due to reduced trade in firms' inputs.

The present work also contributes to the empirical industrial organization literature on industry studies. In particular, ours is the first econometric examination of which we are aware analyzing sales and demand in the Chinese automobile industry, although some work has been done looking at other aspects of the industry (e.g, Gallagher, 2006).

The paper is organized as follows. In the next section, the causes and timing of the boycott in China are presented. In section 3, we summarize the economics of boycotts, focusing on factors that portend the success of a boycott, and show that there are many theoretical reasons to expect that the Chinese boycott of French products would be successful. The stage of the Chinese automobile industry is set in section 4, and a description of the sources and data we use is given in section 5. Section 6 contains the empirical investigation demonstrating that the boycotts had a large impact on the sales of French automobiles in China. A final section summarizes why alternative explanations are unlikely and concludes.

2. The Boycott of French Products: Cause and Timing

The boycott of French products in 2008 is only the latest in a long line of nationalist boycotts in China. The first large-scale economic boycott in modern Chinese history occurred in 1905 over dissatisfaction with the US over restrictions on Chinese labor in the US. Aggravated by defeat in the Sino-Japanese War and the Boxer Rebellion, the labor restrictions caused nationalist sentiments to break out in China, leading to a boycott targeting US imports. Sales of US textiles, petroleum, tobacco, and flour in China quickly slumped (Remer, 1979). Nationalist boycotts

occurred frequently thereafter in the pre-communist era.[6] For more than four decades after the founding of the communist government in 1949, China lost economic contact with non-communist countries and few foreign products were available. Starting again in the 1990s, as China re-entered the global economy, the boycott movements have revived. In recent years, nationalist boycotts have targeted Japan and South Korea.[7]

The boycotts we examine stem from events beginning in March 2008, when political unrest in Tibet over Chinese rule drew the attention of the foreign media. While an in-depth inquiry into the political situation surrounding Tibet is beyond the scope of this research, the important fact for our investigation is that the consensus among internet users and the media in China was that foreign news reports—especially those from Europe—were biased against the Chinese government. Resentment against Europe began to build in China. On March 25, French President Nicolas Sarkozy stoked the fires of umbrage in China by announcing that he was considering expressing his disapproval of the Chinese policies in Tibet by staying away from the opening ceremonies of the Beijing Summer Olympic Games in August. On April 7, large crowds of protesters seriously disrupted the Olympic torch relay as it passed through Paris, jostling a disabled Chinese athlete carrying the flame.[8] On April 21, the Paris city council made the Dalai Lama an honorary citizen, which was generally interpreted by the Chinese people as a message of support for Tibetan independence.

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[6] Further causes for boycotts include the confiscation of a Japanese boat smuggling arms in Macao in 1908, the Twenty-One Demands in year 1915, the treaty of Versailles in 1919, the May 30th Movement in 1925 (targeting Great Britain), the September 18 incident in year 1931, the January 28 incident in year 1932, and so on. Unless otherwise noted, all these boycotts targeted Japan (due to tension over Japanese encroachment upon Chinese territory). See Remer (1979) for detail about early boycotts in China.

[7] Japenese goods were boycotted in response to the denial in a Japanese history text book of the country's military invasions of the Asian continent, and the Japanese government's campaign to become a permanent member of UN Security Council. Korean goods were boycotted in response to UNESCO's designation as a world heritage site the Gangneug Dano Festival in Korea, which many Chinese people view as plagiarizing traditional Chinese culture.

[8] Protesters attempted to snatch the torch from the Chinese athletes bearing it, and succeeded in extinguishing the flame several times during the relay. The torch relay was completed by transporting the torch on a bus. See Katrin Bennhold and Elisabeth Rosenthal, "As Olympic Torch Visits Paris, Protests and Scuffles Follow," *The New York Times,* April 8, 2008, A-6.

Sarkozy's intimation that he would boycott the opening of the Olympics and the interference with the torch relay outraged much of the Chinese public. These events fueled growing resentment in China toward France. The Olympics were a great source of national pride for the Chinese, in a way that may be hard for Westerners to grasp fully. When the 2008 summer games were first awarded to Beijing, Chinese president Hu Jintao stated that "the Olympic Games is the common aspiration of our peoples, is a century-old hope of the Chinese people, and is a major event in the country. We must do our best to perfect the Olympics in order to enhance the self-confidence and fighting spirit of Chinese people, and strengthen the nation's sense of pride and cohesion to achieve the great rejuvenation of the Chinese nation."[9] A few months before the Olympics, nearly eight out of ten Chinese (79%) said that the Olympics were important to them personally (Pew, 2008). In the eyes of many Chinese, the actions by the French struck directly at the pride and great hopes of the nation.

Nationalist reaction in China to the Olympic torch mêlée in Paris was swift. On April 10, the first call to boycott French products appeared on the internet. Within days, a series of highly public demonstrations against French companies erupted, aimed primarily at the supermarket chain Carrefour.[10] During the next few weeks, the boycott of French products, including French-branded automobiles, spread throughout China. Given the high visibility of the Peugeot and Citroën brands in China, French automobiles became a major target, and appeared in lists of brands to boycott in the Internet.[11] Although the Chinese government usually does not allow such demonstrations of public protest, the government itself (through the state-controlled media) attacked the supposed anti-Chinese bias of the foreign media in the first few weeks of April. The

[9] *Xinhua News Agency*, Oct. 1, 2006, http://news.xinhuanet.com/politics/2006-10/01/content_5162706.htm (translation from the original by the authors).
[10] Rumors on the internet alleged that the Carrefour Group funded Tibetan activists. Initial demonstrations and protests against Carrefour shopping centers occurred in Wuhan, Kunmin, Heifei, and other cities.
[11] See http://blog.sina.com.cn/s/blog_3d6eb30f01009ajc.html for one such list. The attention forced the manager of the Chinese company in joint venture with PSA Peugeot Citroën for the production of French automobiles, Dongfeng Shenlong, to make a clear statement of support for the Chinese government at the 2008 Beijing International Auto Show (http://space.foolcars.com/?uid-118-action-viewspace-itemid-1777).

government's position appeared to change on April 18, when the official Xinhua News Agency called for "patriotic zeal to concentrate on development." Despite the change in the official position, a poll of Chinese respondents conducted April 18-20 found that 60% "registered a growing dislike for France" and that 39% were in favor of "boycotting foreign merchandise such as those made in France."[12] Around this time, the French government attempted to ease the situation through diplomacy.[13] The visible demonstrations against French products and the government of France were curtailed on April 22 when the Chinese government intervened.[14] Regardless, the internet was still rife with sentiments against French products and lists of French brands to boycott.

Anti-French sentiment appeared to die down in China after the Olympic Games in August. However, on November 13, Sarkozy announced that he would meet with the Dalai Lama. The meeting occurred on December 6, and was reported in the official Chinese press as an expression of France's support for the separation of Tibetan territory from China.[15] The Chinese government summoned the French ambassador to protest the action strongly, and the event again provoked a strong reaction among Chinese internet users, who renewed the calls to boycott French products.

The precise timing of the boycotts is difficult to determine by the methods used in the economic boycott literature. Chavis and Leslie (2009) use the number of news articles on the event they study to measure the intensity of the call for the boycott. However, counting

[12] The poll is reported in Zhou and Jia, 2008.

[13] Diplomatic efforts included sending a former prime minister of France to negotiate with the Chinese government, and hand-delivering on April 21 a letter of condolence from President Sarkozy to Jin Jing, the disabled athlete who was attacked by protesters in Paris while bearing the Olympic torch.

[14] On April 22, in its first direct comments on the boycott, the Chinese government commended Carrefour's operations in China and praised its support for the Beijing Olympics (see http://cn.reuters.com/article/wtNews/idCNChina-1029720080422 for a Chinese-language article from Reuters, April 23, 2008).

[15] Once again the language of personal pride and honor projected to the national level was invoked. One editorial in China Daily accused, "The French president knowingly offended the people he now says he wants to befriend, without showing repentance" (reported in "China press berates Sarkozy," *The Straits Times*, December 12, 2008, http://www.straitstimes.com/Breaking%2BNews/Asia/Story/STIStory_313593.html.

newspaper articles or measuring other media attention given to boycott activity presumes that media attention reflects the feelings and activities of consumers, which is less likely to be the case with China's state-controlled media.[16] In fact, by the end of April the Chinese authorities actively sought to hinder the boycott.[17]

Nonetheless, we present in Figure 1 a time series of newspaper articles indexed in WiseNews, a media database covering Chinese newspapers. We count articles two ways. The first bar for each month in the Figure shows how many news articles include the Chinese words for "boycott" and "French products" during the month. The second bar is a similar count using the terms "boycott" and "France." Either measure shows a spate of articles in April 2008 at the time of the Olympic torch protests, which dwindles rapidly in succeeding months as the official position toward the boycott changed. Given the empirical results we find below, we do not believe that the near disappearance of news articles about the boycott by August reflects improving consumer sentiment toward French automobiles. A second spike in French boycott articles occurs in November and December 2008 in response to the meeting between Sarkozy and the Dalai Lama. Instead of relying on this evidence to determine the dates of the boycott in our empirical estimations, we instead adopt a flexible difference-in-difference specification that allows the data to show when sales of French automobiles dropped relative to other brands.

3.   The Economics of Boycotts

At first glance, the existence of successful boycotts presents a puzzle to economists. As a form of collective action, boycott participation is subject to the problems associated with small agents

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[16] Similarly, we are not aware of unbiased polls of Chinese citizens throughout 2008 that could be used to document month to month changes in attitudes. One foreign poll showed that Chinese respondents' positive views of France dropped to 44% in December 2008, a decrease of 20 percentage points from a year previous ("Views of China and Russia Decline in Global Poll," *BBC World Service Poll*, February 6, 2009, http://www.worldpublicopinion.org/pipa/pdf/feb09/BBCEvals_Feb09_rpt.pdf.
[17] Western correspondents in China reported that state censors were blocking text messages promoting the boycott and that certain Chinese-language internet search engines were returning blank pages in response to queries about the boycott, with messages stating that the searches "do not conform to relevant law and policy" (Andrew Jacobs, "Despite Boycott Threat, a French Retailer's Aisles Are Far From Empty in China," *The New York Times*, May 2, 2008, p. A-6).

and free riding. Any *instrumental* conception of a boycott, in which the action is meant to influence the behavior of the boycotted firm, must struggle with the fact that individual consumers are typically so small in the market that it is irrational for any one buyer to believe that he would have any noticeable impact on the profits of the firm (John and Klein, 2003). Since participating in a boycott entails a utility cost from the forgone consumption, participation is therefore not likely to be individually rational. Furthermore, since an individual will share the benefits from a successful boycott regardless of participation, free riding is a tempting option. However, just as people vote despite the Voting Paradox, people boycott.[18]

While some studies solve the "boycott paradox" within models incorporating rationality (e.g., Baron, 2003),[19] others look to behavioral explanations. John and Klein (2003) develop models with both instrumental and *noninstrumental* motivations for participating in boycotts. The latter include motives such as expressing anger or the desire to punish the firm. In the instrumental model of John and Klein (2003), a firm's "egregious act" creates disutility for consumers while it is ongoing. Consumers boycott the firm in response, which entails a utility cost, intending their actions to goad the firm into ceasing the offensive action. Participation in the boycott is higher when the utility cost of participating is lower and when the disutility of the offensive act is higher. Given the intensely competitive Chinese automobile market and the multiplicity of brands introduced in the last few years,[20] the cost of participating in a boycott of French automobiles would appear to be low for most consumers due to the availability of good

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[18] A recent national survey found that one-third of Americans participated in a boycott during the past year (StrategyOne, "Voting With Their Wallets," April 19, 2010, http://www.pitchengine.com/strategyone/voting-with-their-wallets--/58625/).

[19] The model of Baron (2003) steps around the collective action problem by assuming an interest group of activists brings the pressure to bear on the firm.

[20] In 2008, there was an average of 57 brands offered for sale in any one month in our EMIS data. An unpublished analysis in the tradition of Berry, Levinsohn, and Pakes (1995) of brand-level data on Chinese automobile sales in February 2009 by the authors yields own-price elasticities ranging between -0.6 and -10.9, with an average of -2.4 and a median of -2.1. Thus, the market appears to be relatively competitive and possibilities for substitution abound.

substitutes. In the previous section, we presented evidence that many Chinese perceived the disutility of France's policies toward Tibet to be high.

While instrumental models of boycotts identify some factors related to boycott success, two extensions are appropriate for the Chinese events we examine. If the goal of the boycotters is to modify the behavior of the French government, then it is a *surrogate boycott*, in which the offending party is not directly accessible to the boycotters and so other targets are chosen to bring pressure to bear on the offending party (Friedman, 1999). To the extent that the targets of the boycott are able to pressure the offending party, the model of the instrumental boycott continues to apply. Therefore, the more political influence the target has, the more likely the government will cease the egregious acts (Friedman, 1999, p.30). In the case of a surrogate boycott of French products, automobiles therefore make a tempting target, since PSA Peugeot Citroën is the seventh largest French company.[21]

However, the Chinese events may best fit the mold of an *animosity boycott*, in which consumers boycott all products from a country whose past policies or actions create extreme displeasure (Klein, Ettenson, and Morris, 1998).[22] Animosity boycotts are an example of a noninstrumental boycott, and Remer (1979) argues in his classic work that in China they are an expression of Chinese nationalism. John and Klein (2003) show in models of noninstrumental boycotts that participation is increasing in the psychological gain from expressing anger or desiring to punish the firm. Participation also increases in the guilt or dissonance that a consumer would experience buying the boycotted product.[23] Given the virulence of the calls to boycott French products found on the Internet, both factors may be large in this case. In another variant of the model, John and Klein (2003) show that when social gains for participation create

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[21] The ranking is based on sales, from the Fortune Global 500 list for 2008.

[22] It is interesting to note that the study of animosity boycotts by Klein, Ettenson, and Morris (1998) also concerned consumers in China.

[23] Glazer, Kanniainen, and Poutvaara (2008) show that even when some consumers bear no disutility from the firm's egregious act, but gain utility from the *appearance* of having moral considerations, boycotts can be successful.

network effects, due to social norms concerning conformity and participation in group causes, boycott participation is easier to achieve. It is commonly asserted that Chinese society places more emphasis on conformity and social harmony than Western cultures.[24] Finally, when social pressure is exerted on nonparticipants, boycotts are also easier to sustain. In the case of automobile purchases, nonparticipation is hard to hide, since others readily observe the vehicle one drives.

In summary, there are six factors that prime a Chinese boycott of French automobiles for success: the cost of participation is low, the perceived harm from the egregious acts is high, the French automobile company is likely to be an effective surrogate, the motives of expressing anger and the desire to punish are present, the value placed on conformity may be high, and nonparticipants can be identified easily.

4.   The Chinese Automobile Industry

China is now the largest motor vehicle market in the world, having surpassed Japan in production and the US in sales in 2009.[25] The large majority of automobiles sold in China, including those with a foreign brand (e.g. Ford or Peugeot), are produced domestically. Foreign brands are produced by joint ventures between domestic firms and the foreign company, because Chinese law does not allow a foreign automobile manufacturer to produce vehicles on its own in China. The Chinese domestic partner must own the majority of the joint venture's stock. An irony of boycotting French automobiles, therefore, is that a Chinese company absorbs the largest part of the blow. In 2008, 28% of automobile sales were of Chinese brands, 65% were of

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[24] Many Chinese sociologists argue that the Confucian concept of the primacy of social relationships underlies Chinese society. As Stockman (2000, p.72) notes, "the [Chinese] self is often seen as seeking harmony with its social environment through conformity with its demands." While some critics caution against an "over-Confucianized view of Chinese society" (King, 1985, p.60), it is nevertheless a saying in China that "the nail that sticks up gets hammered down" (or more literally: "the bird which sticks its head out of the tree hole gets beaten down").

[25] Production data are from the OICA, available at http://oica.net/category/production-statistics/, and include both passenger cars and commercial vehicles.   Sales data are from the China Association of Automobile Manufacturers (CAAM), quoted in Reuters, "China car sales top U.S," January 11, 2010, available at http://www.reuters.com/article/idUSTRE60A1BQ20100111.

domestically produced foreign brands, and the remaining 7% were of imports.[26] Of the foreign

brands manufactured in China, about one half are Korean and Japanese brands, and the rest are

split equally between European and US brands. Automobiles of the two French brands produced

in China, Peugeot and Citroën, composed 2.6% of total sales in 2008.[27]

Until the global economic crisis hit the Chinese automobile market in mid 2008, the

industry had experienced phenomenal growth. Figure 2 depicts sales from 2005 through the

beginning of 2009. The year-on-year growth rates were over 20% through 2007. Growth

slowed in 2008 due to the weakened economy, although sales were still up 6.7% for the year,

which was the lowest rate of increase in 10 years.[28] Although the Chinese government instituted

tax cuts and subsidies to stimulate the automobile market, these were not in place until late

January, 2009,[29] and so do not affect sales during the boycott period we examine most carefully

(quarters two through four of 2008).

5. Data

The sales data for our analysis is obtained from Emerging Market Information Service (EMIS).

These data include monthly sales data by model on all domestically produced non-commercial

passenger automobiles marketed in China from December 2004 through the first quarter of 2009.

The EMIS data also includes data on imports, but these data are not broken out by model. Since

only a small portion of cars sold in China are imported, we group imports together in our

estimations. Thus, the automobiles we treat as "French" in our data are the 19 models produced

domestically by Dongfeng Peugeot Citroën Automobile Company (DPCAC). DPCAC is a joint

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[26] The monthly market share of imported vehicles peaks at under 7% during our sample period. An additional one to two points of market share goes to "complete knock downs," vehicles largely assembled abroad and imported in an incomplete state for final assembly in China.

[27] Figures are the authors' calculations, based on the EMIS data we describe in the next section.

[28] The source for these figures is CAAM, quoted in China Daily, "China's 2008 auto sales growth hits 10-year low," January 12, 2009, available at http://www.chinadaily.com.cn/bizchina/2009-01/12/content_7390508.htm.

[29] Furthermore, the stimulus measures were targeted to smaller-engine cars regardless of manufacturer, and thus apply to French branded cars as well as others. See Li Fei, *China Daily*, "Auto sector gets a shot in the arm," January 15, 2009, available at http://www.chinadaily.com.cn/china/2009-01/15/content_7398681.htm.

venture between a domestic Chinese automaker and PSA Peugeot Citroën, the French manufacturer of vehicles sold in the Peugeot and Citroën lines.

Characteristics of the vehicles are collected from the website of PCauto, one of the largest automobile portals in China. The power of the automobile is measured with the engine size, acceleration (the time in seconds needed to reach 100 kilometers (km) per hour (kph) from a standstill), and top speed (in kph). The size of the vehicle is measured by its dimensions (length, width, and height in meters), its luggage space (in liters), and the number of seats. The fuel efficiency is measured by the number of liters needed to drive 100 km. The final attribute is the capacity of the fuel tank (in liters). For the brand level data, the attributes of the models are aggregated by calculating the quantity-weighted average.

Some of the average characteristics of vehicles by nationality of the brand are presented in Figure 3.[30] April 2008 (month 41), the start of the boycott period, is marked with a vertical line on each graph in the figure. The figures reveal that French models occupy a middle ground in the product space. Compared to Chinese models, French brands on average are larger vehicles with higher-capacity engines that are less fuel-efficient but can accelerate faster and reach much higher speeds. This is mainly because Chinese vehicles have minuscule engines, use little fuel, cannot go very fast, have poor acceleration, and are tiny (by Western standards). However, in comparison to brands from nations other than China, French models are the *most* fuel efficient, and have the smallest engines, length, and width. Notwithstanding, they do not fare the worst with respect to top speed or acceleration. Given differences among models and brands, we control for vehicle attributes in several ways in the estimations.

There is no publicly available source of comprehensive price data for automobiles sold in China. We gather price data from two sources: EMIS and the National Development and

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[30] The figures are weighted by sales to reflect the average characteristics of the actual fleet. Only those nations with at least as much market share as the French brands are included in the figure.

Reform Commission (NDRC).[31] Nonetheless, there are many models for which prices are not available. Neither data source covers prices of all models, and even when there is price data for a model the monthly coverage is often incomplete. However, prices do not play an important role in our analysis because we do not attempt to identify a demand curve for automobiles, and we examine the (incomplete) price data only informally. The lack of price data does prevent us from examining the impact of the boycotts on automakers' revenue.

6.   Empirical Investigation

We begin by looking at sales trends for French and other automobiles sold in China. Figure 3 depicts sales levels (quantity of vehicles sold) from the EMIS data for one year each before and after the initiation of the first boycott in April 2008. The solid line shows French sales, and the dashed line shows sales of other domestically produced automobiles. To aid visual comparison of percentage changes in sales, the trends are scaled so that the vertical height on the graph matches in March 2008, the last month before the boycott begins (see the right vertical axis for non-French sales levels). In the year before the boycott, sales of French and other vehicles generally move together. In the year after the start of the boycott, sales of both are down until the final month, due to the worsening global economy. However, French sales drop more (in percentage terms) right away in April, and the gap widens throughout the summer months until the Olympic Games in August 2008. These months, marked as group 1 on Figure 3, correspond to the first boycott triggered by the Olympic torch incident in April. The sales gap narrows a bit in September, and then widens again in October-December. November and December 2008, marked as group 2, correspond to the second boycott called in response to the Sarkozy-Dalai Lama conference. After December, the sales gap narrows again.

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[31] The NDRC is China's organization for central planning and management of the economy.

Although Figure 3 suggests that the boycotts may have been responsible for the lost sales of French automobiles relative to others, there are many other factors to examine before a conclusion can be drawn. In the next section we formalize the investigation of differences in sales of French cars over time and relative to other brands with a difference-in-difference model. We also control for the average characteristics of each brand's fleet and for non-linear time trends, and consider an alternative matched sample for estimation of sales at the model level.

Econometric Model

The choice of dependent variable for the estimations involves several considerations. First is the choice between market share and sales levels. We use market shares for the dependent variable in most of our estimations, but also explore the quantities sold in alternative specifications. When the dependent variable is market share in the main estimations, we use the level instead of the log, since it is more natural for examining substitution patterns. When a French brand loses a point of market share, that point must be distributed directly to other brands.[32] While in theory this redistribution of market share affects the interpretation of our difference-in-difference estimates, the issue turns out empirically to be essentially ignorable, as we demonstrate in an appendix.[33]

Another question is whether to define the unit of observation to be a specific model of automobile (e.g., the Peugeot 307) or the brand (e.g., Peugeot). While previous studies of boycotts using sales microdata used a single product as the unit of observation (Chavis and Leslie, 2009; Ashenfelter, Ciccarella, and Shatz, 2007), we choose the brand for our main

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[32] Logs are a natural choice for right-skewed data such as market shares in the sample, but the log of market share is left-skewed.

[33] Identification of the impacts of treatment effects in difference-in-difference models usually rests on the assumption that the change in market share between the pre- and post-boycott periods for the control group (the non-French brands) is unaffected by the boycott. In our application, however, if French brands lose market share, then the market share of non-French brands must increase. In the appendix, we show that the empirical implications of this do not significantly effect the interpretation of the difference-in-difference estimates.

estimations.[34] Enough models appear or disappear during the observation window that identifying differences in sales trends over time from sales of specific models is fraught with problems caused by composition bias. Furthermore, it is natural to aggregate to the brand level since the boycott targeted automobiles based on the origin of the brand (French), and not specific models. Nevertheless, as an additional check on the robustness of our results, we estimate one specification using model level sales, where we avoid composition bias by creating a matched sample of models. However, for our main estimations the dependent variable y_{it} is taken to be the quantity market share of sales of automobile brand i in month t, expressed on a 100 point scale.

The remaining question is how to model the impact of the boycott. Instead of arbitrarily assigning a group of months to a dummy variable for a boycott indicator, we adopt a flexible specification that, while assuming that the boycott began in April 2008 at the earliest, makes no assumptions about how long it lasted and allows its impact to vary non-parametrically month to month. The model for the estimation is:

$$y_{it} = \alpha_i + \lambda_t + \beta_t B_{it} + \delta x_{it} + \varepsilon_{it} \tag{1}$$

where α_i and λ_t are fixed effects for brand i and month t, respectively; x_{it} is a vector of average vehicle characteristics of a brand in a period, and ε_{it} is the econometric error term. In our full sample, t runs from 1 (December 2004) to 52 (March 2009), although in most specifications we use months 27 (April 2007) to 52. The shorter period, which includes one complete year before and after the initial call for a boycott of French products in April 2008 (month 41), is chosen for two reasons. It reduces the turnover of models in the sample, which alleviates potential problems of composition bias. The shorter span also limits the sample to periods in which total

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[34] As noted above, the one exception is that imports are grouped into one "brand" for analysis.

sales of automobiles are more comparable. As depicted in Figure 2, the sales from 2007 on are much greater than in earlier years.

The brand fixed effects α incorporate all differences across brands in average automobile attributes, effects of advertising, and other supply and demand factors, as well as any other factor affecting market share that does not change over time. The time fixed effects λ remove month-to-month changes in the market share of an average firm. If the number of brands never changed, there would be no changes over time in average market share.[35] However, the number of brands does change during the period we examine, and so the time fixed effects control for changes in average market share due to changes in brands offered for sale. Including λ also allows the interpretation of β_t as a set of difference-in-difference coefficients.

The term of interest is $\beta_t B_{it}$, which captures the impact of the boycott on the market share of French automobiles. The variable B_{it} equals one when brand i is French (Citroën or Peugeot) and $t \geq 41$ (the potential boycott period); B_{it} is zero otherwise.[36] Thus, the β_t (which is identically set to zero for months before the boycott) compose the set of difference-in-difference coefficients for the months of the boycott. That is, β_t measures the change in market share of French automobiles during the months of the boycott, relative to sales of French cars before the boycott, and net of changes in the market share of non-French brands. By including average vehicle characteristics x_{it}, the difference-in-difference coefficients are also net of changes due to the composition effects of the attributes of the fleet sold in the month for a brand.

It is important to note that equation (1) is not a demand equation, but instead is a reduced form equation for market share in equilibrium. Thus, β_t does not measure precisely the impact of the boycott on consumer demand, but also incorporates the influence of price changes and any

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[35] In particular, with N brands offered each month, average market share would be $1/N$ each month and there would be no need for time fixed effects.
[36] Strictly speaking, as described above the variable B_{it} captures only French cars produced domestically in China.

other supply-side responses of the firms as well. In particular, one would expect (and there is anecdotal evidence to suggest[37]) that if the boycotts were effective that the struggling French brands would lower prices.[38] We examine prices later in the paper. However, to the extent that prices were lowered to prop up sales of French automobiles, any impacts the difference-in-difference estimates reveal on the quantity demanded are lower bounds on the actual impact on the demand function.[39] Since (1) is a reduced form equation, we also have no expectation for (and will not report or interpret) the signs for the vehicle characteristics, since the estimated δ will incorporate both demand for the attributes as well as supply side cost factors.

Basic Estimation Results

The estimated effects of the boycott movement on French automobiles are displayed in Table 2. There are three estimations in Table 2, varying in the controls included in the specification. In all estimations, the standard errors are robust to heteroskedasticity and clustering on brands.[40] The first column shows the estimated boycott effects and its robust standard error. The second column expresses the impact in percentage terms of sales.[41]

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[37] A salesman at a Citroën dealership in Beijing told reporters that despite "huge discounts" sales were less than half of what they were the previous year. See *Global Auto Sources Automotive News*, "Tensions may push Citroën sales down in China," December 11, 2008, available at http://autonews.gasgoo.com/auto-news/1008686/Tensions-may-push-Citroen-sales-down-in-China.html.

[38] It is theoretically possible that the boycott could cause the average prices of French automobiles to increase if it is mostly buyers with high price elasticity of demand that are driven to other brands. However, this does not appear to have happened, as we discuss below regarding Figure 6.

[39] If the automobile sales market were competitive, this is tantamount to saying that if the supply curve has a positive slope, then changes in the quantity demanded in equilibrium understate the amount by which the demand curve shifted to the left, since the new equilibrium is farther down the supply curve.

[40] Although previous papers examining boycotts with sales microdata (Chavis and Leslie, 2009; Ashenfelter, Ciccarella, and Shatz, 2007) apparently did not do so, clustering on the unit of observation in the calculation of standard errors, which relaxes the assumption of independence among observations from different periods for the same unit, is now standard practice for panel data to avoid overstating the significant of estimates (see section 21.2.3 of Cameron and Trivedi, 2005).

[41] The percentage impacts are calculated as follows. Using the fitted values from the regression, sum those for the French brands to calculate estimated French market share $\hat{F}_t$ in all boycott months. Then calculate the counterfactual French market share $\tilde{F}_t$ using the regression coefficients with B_{it} set to zero. The figures reported in the second column for each estimation in Table 2 are $(\hat{F}_t - \tilde{F}_t)/\tilde{F}_t$.

In estimation 1, only the time and period fixed effects are included. The estimated difference-in-difference coefficients for the potential boycott period, γ_{41}-γ_{52}, display the quintessential pattern that we generally find in all estimations using the brand-level data. The coefficients are depicted in Figure 5 with the black line. There appear to be two distinct phases to the impacts of the boycotts. The first boycott, beginning in April 2008, has little apparent effect at first. Although the French brands lose about 0.17 points of market share (all figures are on a 100-point scale) in April and May, which represents a loss of about 9% of their sales, the estimates are not significant. The size of the negative impact grows steadily through August 2008, when the Olympic Games were held in Beijing, so that by August the French brands have lost a half point of market share. The lost sales represent a 25% reduction in sales relative to the counterfactual without the boycott. The impacts are significant at the 10% level for May, at the 5% level for June, and at the 1% level for July and August. After the Olympics, although French sales are still down in September and October, the impacts are not large enough to be significant.

The effect of the second boycott against French products, spurred by the announcement in November that Sarkozy planned to meet with the Dalai Lama, is large and significant that month and in December, when the meeting occurred. French market share is down more than a half point in both those months, which is 26-28% of sales. After this sharp but brief downturn in the last two months of 2008, the impacts become small enough to lose significance.

The pattern in estimation 1—a first boycott gaining strength and lasting through the Olympics and a second boycott in response to the Sarkozy-Dalai Lama meeting—is remarkably robust to alternative specifications. To begin with, in results not shown, we re-estimated specification 1 with all months of data, and found a similar pattern.[42] We also checked the onset

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[42] The difference-in-difference coefficients in the alternative estimation with the entire sample (months 1 through 52) display the same pattern over the boycott year but are even larger. The coefficient starts at -0.3 in April, rises monotonically to -.7 in August, drops in September and October, rises to its highest level in November (-0.67) and

of the boycott period by re-estimating specification 1 with a β_t for March 2007 (in effect,

pushing the boycott period back one month). As expected, the difference-in-difference

coefficient for March 2007 is statistically indistinguishable from zero, which provides evidence

that the results are not driven by trends in the gap between market shares of French and other

brands unrelated to the boycotts. Next, in estimation 2 in Table 2, we include the variables

measuring the average characteristics related to vehicle size, power, fuel efficiency, and capacity.

Adding these characteristics helps remove the effects of quality changes on the market shares.[43]

The pattern of the level and significance of the boycott effects is the same as in estimation 1,

although the size of the impacts is generally larger, particularly for the second boycott. The

coefficient of -0.62 for December corresponds to almost a one-third decrease in sales.[44]

In specification 3 in Table 2, we take into account country specific time trends of sales.

This is to rule out the possibility that the estimated negative boycott effects in the estimations

merely reflect a longer-term downward trend in sales of French automobiles, relative to other

countries' brands. To better estimate the pre-boycott trends, estimation 3 includes the full data

set spanning more than four years, which nearly doubles the sample size from estimation 2.[45]

The modified model adds quadratic country-specific trends as follows:

$$y_{it} = \alpha_i + \lambda_t + \beta_t B_{it} + \delta x_{it} + \gamma_{1k} t + \gamma_{2k} t^2 + \varepsilon_{it} \qquad (2)$$

where k indexes the country of origin (or the group of imports) of brand i, and t is the month,

which takes values from 1 to 52. The other notation is as in equation (1). The results in the last

columns of Table 2 display the same pattern as found above in both size and significance,

December (-0.70), and falls in the last three months. As in estimation 1, the coefficients for July, August,
November, and December are statistically significant at the 1% level.

[43] Adding the vehicle characteristics to the regression entails a small loss in sample size, since they are not available
for a few observations.

[44] In other estimations not shown, we re-estimated specifications 1 and 2 letting the two French brands have separate
sets of difference-in-difference coefficients, to see if the observed pattern of boycott impacts was driven by only one
of the brands. It appears not. In both specifications, the coefficients for July, August, November, and December are
negative and statistically significant at the 1% level for both brands (except for Citroën in specification 2 for July,
which is significant at the 5%).

[45] Refer to footnote 42 above; the results of the previous estimations are not driven by the shorter sample period.

showing the effects of the two boycotts. Neither coefficient for the background trend for French automobile share is significant, but the implied trend is upward sloping and concave, which suggests that if anything French brands were gaining market share relative to the competition before the boycotts. This trend is also reflected in the estimated percentage impacts of the boycott terms, which are larger than in the previous estimations. The results show that when correcting for the upward trend of French automobiles before the boycotts (as well as trends in other countries' sales), sales were 15-27% lower in June-August 2008 and were 30-33% lower in November-December 2008.

Alternative Specification: Log Sales

As an additional check on the results, we rerun estimation 1 with the dependent variable redefined to be the number of vehicles sold of brand i in month t, in logs. This choice for y_{it} is equivalent to regressing the log market share.[46] The results, estimation 4 in Table 3, display the same pattern found in our main set of estimations. Sales are down in both boycott periods. The magnitudes of the boycott effects are generally larger in these estimations than in the corresponding estimation 1. The impacts range from a 22-37% sales loss in the months of the first boycott (June-August) to a 35-45% sales loss during the second boycott (November-December).[47]

Alternative Specification: Non-Chinese Sample

In specification 6, we address another potential concern. Even though we control for average vehicle characteristics in estimations 2 and 3 above, it may nonetheless be the case that the non-French automobiles are too different to serve as an adequate control group. Another possibility is that attributes of French and other vehicles diverge over time in such a way that leads Chinese

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[46] Letting y_{it} be quantity sold, brand market share is then $z_{it} = y_{it}/y_t$, where y_t is total market quantity in month t. Thus $\log(y_{it}) = \log(z_{it}) + \log(y_t)$, and since $\log(y_t)$ is absorbed by the period fixed effects, regressing either $\log(y_{it})$ or $\log(z_{it})$ yields the same coefficients β_t for the boycott.

[47] Here we rely on the interpretation of the coefficients in a log-linear regression as approximations to percentage changes due to the regressor taking value one instead of zero.

consumers away from purchasing French automobiles. For example, perhaps changing tastes for vehicle characteristics or fuel efficiency disproportionately disadvantaged French models. The latter consideration may be especially important given that the price of fuel changed substantially during our sample period. With a few minor exceptions, oil prices (the main determinant of gasoline prices) were steadily rising in China throughout our sample period until July 2008: the spot price of Chinese oil rose from $67/barrel in April 2007 to $140/barrel the week of July 11, 2008.[48] Thereafter, oil prices fell steadily until by the end of the sample it was $43/barrel. While the time fixed effects control for the impact of fuel prices on overall sales, it may yet be a possibility that if French-branded vehicles are less fuel efficient than others, we may be mistaken in attributing the reduced sales of French vehicles in June through August 2008 to the first boycott.

To investigate this possibility, we first note from Figure 3 that French vehicles did not undergo radical or even marked changes in characteristics during 2008 that could explain sales differentials by themselves. However, as noted above, French models tend to be less fuel efficient than Chinese models. The comparison opens the door to the possibility that a shift in preferences toward thrifty Chinese "econoboxes" (or stable preferences and declining income during the worsening global recession during 2008) explains the French decline. However, given that French brands are the smallest and most fuel efficient of the non-Chinese fleets, it would appear that if taste for fuel efficiency or vehicle size were driving demand away from larger automobiles toward Chinese models, the French brands should be affected least.

Nevertheless, Figure 3 makes clear that the average Chinese vehicle differs from the foreign-branded automobiles. Thus, in estimation 5 (in Table 3) we sharpen the control group not only by controlling for vehicle attributes but also by dropping Chinese brands. Dropping the

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[48] The prices are from the Energy Information Administration's series "China Daqing Spot Price FOB (Dollars per Barrel)", available from http://tonto.eia.doe.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=WEPCDAQ&f=W. The prices of oil futures on the world market follows a generally similar pattern.

Chinese brands reduces the sample size by more than half. The results again display the usual pattern, with the exception that (due to a larger standard error from the smaller sample) the coefficient for November 2008 is not significant. Even in this month, however, the magnitude of the coefficient is the same as in estimation 4. We conclude that the change in relative demand for brands found in the estimations is not driven primarily by characteristics that change over time or by demand factors related to the relative importance of vehicle attributes but unrelated to the boycotts.

Alternative Specification: Matched Sample

The identification strategy used in estimations 1-4 relies on comparing the sales trends of French automobiles and other brands sold in China. We refined this approach in estimation 5 to check whether dropping Chinese vehicles changed our basic conclusions, and found that it did not. There remains the question of whether the average vehicle characteristics used in estimations 2 and 5 cause aggregation bias or otherwise lead to results that would not arise from a more closely matched control group. To address these possibilities we create an estimation sample using monthly model-level sales figures. The sample includes all 19 French models sold between April 2007 and March 2009. Matched to each of these models are observations for the same months on the three non-French models that are most similar to the French automobile.[49] Matching creates a control group that is composed of the models that most closely resemble the French vehicles, removing possible divergence of vehicle attributes in the sample over time. The metric for similarity is the Mahalanobis distance in the space of the 11 vehicle characteristics in

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[49] Thus, we use a "nearest neighbors" matching technique. We chose the three nearest neighbors instead of the single nearest in order to have a larger sample size. Although a single match is often used in practice, Imbens and Wooldridge (2009) state that using a single match, while giving the least bias, entails a loss of precision in the estimates, and that "little is known about the optimal number of matches" (p.38). Results from using the nearest one, two, and four matches were essentially similar, although those with fewer than three matches had larger standard errors. Notwithstanding, the coefficients for at least the second boycott period were always significant at the 5 percent level.

the data.[50] Matching is performed with replacement (to better the quality of the match and reduce bias),[51] and so some of the non-French models are matched to more than one French model.[52] The difference-in-difference specification from equation (1) is used, although since fixed effects for the models (as well as for the month) are included there is no need to include vehicle characteristics as additional regressors. The dependent variable is log sales.

The results from the matched sample are in Table 3, labeled Estimation 6. The coefficients are also depicted in Figure 5 with the gray line.[53]   The same general pattern found in the brand level estimations persists. The decline in sales begins immediately in April with a 25% reduction in sales relative to the matched models and to sales before the boycott period (and, unlike the previous estimations, the decline is significant). The sales trend continues to head downward during May and June. The two slight differences between these results and those from the previous estimations are that the sales decline reaches a plateau earlier (in June 2008) and holds it one month later (through September), and that sales do not drop as much after the Olympics. For the first boycott period, five of the six difference-in-difference coefficients (those for April through September) are significant at the 10% level or better. At the plateau during June through September, the coefficients are in the range of -1.0 to -1.1, which implies losses of French-branded sales of more than 100% relative to sales of the control group.[54] The

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[50] The Mahalanobis metric, the most commonly used distance metric in the matching literature (Imbens and Wooldridge, 2009, p.38), is based on the inverse of the covariance matrix of the characteristics. Letting a and b be two column vectors of characteristics, and C be the sample covariance matrix of the characteristics estimated from the data, we measure the distance between a and b as $(a-b)'C^{-1}(a-b)$.

[51] To make the matches consistent during the sample period, a non-French model is eligible for matching a French model only if it was offered in the market every month the French model was (since the point of the approach is to avoid bias due to changes in the composition of the control group).

[52] Models in the control group that are matched to more than one French model thus appear multiple times in the estimation sample. Since the standard errors account for clustering at the model level, such cases are in effect not "counted twice" when calculating the precision of the estimates.

[53] Since the scale of the coefficients differs from Estimation 1 (which was for brand level market share), the results from Estimation 6 (for model level sales) plotted in Figure 5 have an alternate scale. This allows the similarity in the overall shape of the patterns to be most clearly discerned.

[54] Losses in French sales can be greater than 100% because sales of the control group were trending up during this period. That is, with a log-linear differences-in-differences specification it need not be surprising to find

strongest impacts, both in terms of magnitude and statistical significance, are seen again for the second boycott period, with coefficients of -1.3 for November and -1.5 for December. In summary, the results from the matched sample of individual model sales strongly bolster the findings from the main estimations.

Prices during the Boycotts

As mentioned above, equations (1) and (2) are reduced form, and as such do not include prices. Although our price data are too incomplete to add them to our econometric investigation, we can still visually examine pricing trends. Average prices of the fleets sold each month for French and other brands are shown in Figure 6. Although caution in interpreting the trends is in order, since the prices are not quality-adjusted, some of the movement is due to composition effects, and there are many missing data, a few general observations can be made. Starting in March 2008, a large price gap appears to open between French and other brands, with the French brands being cheaper. The price gap remains largely the same during the first boycott period, until French vehicles' prices begin to rise sharply in September at the same time that non-French brands have falling prices. Whether the drop in prices of French vehicles is due to the boycott cannot be demonstrated, but the pattern is at least consistent with a reduction in demand.

During the second boycott, the price gap between French and other brands narrows in November but widens in December. Given that December 2008 had the largest estimated negative impact of any of the boycott months, the price movement is again consistent with (but does not prove) declining demand for French automobiles.

Substitution Patterns

The results to this point show that the market share and prices of French automobiles fell during the boycott periods, but apart from coincident timing do not prove that the boycotts were

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coefficients less than -1. For example, if sales in the control group rise 50% and sales in the treatment group decrease by 75%, then the difference-in-difference coefficient would be less than -1.

responsible. In this section, we offer further evidence suggesting that the boycotts triggered the sales declines. When consumers boycott French brands, their most likely alternative action is to switch to substitute brands of other origin (we consider intertemporal substitution below). Given the patriotic nature of the protests in China, one would expect that Chinese automobile sales would benefit from the boycotts. Furthermore, in the impressions of many Chinese people, the Western media displayed an unfriendly attitude toward the Chinese government's policies,[55] and so one would expect that in general substitution would be to automobiles from non-Western countries. If the decline in sales of French brands is unrelated to the boycotts, then there is no particular reason that (after controlling for vehicle attributes) Chinese brands should benefit disproportionately to other brands or that other Western brands should share French brands' fate.

To investigate substitution among brands, we rewrite the model to include a full set of interactions between the month and the country for the boycott period. To reduce the number of coefficients to be estimated, countries are grouped. The country groups are France, other Western European countries, China, other Asian countries, the US, and a residual "other" group including imports and Czech automobiles. The model is:

$$y_{it} = \alpha_i + \lambda_t + \sum_k \beta_{kt} B_{kt} + \delta x_{it} + \varepsilon_{it} \tag{3}$$

where B_{kt} is an indicator variable taking value one when brand i is from country group k and the month is $t \geq 41$ (i.e., a month in the potential boycott period). In equation (3), the term involving βB therefore allows the impact of the boycott to be traced out at the origin-month level in a completely flexible way. For identification, France is the excluded country when defining the B_{kt} in equation (3) (so that $\beta_{kt} = 0$ for French brands for all t). With this specification, the β_{kt} for the non-French countries show the change in market share relative to the change for the French

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[55] One poll in April 2008 found that 86% of Chinese respondents said they "tended to believe in the reports of domestic media while those who were inclined to believe the Western media accounted for only 2 percent" (Zhou and Jia, 2008).

brands. Given the declining overall sales level during 2008, as mentioned above in the

discussion of Figure 4, a reallocation of French market share to brands of other origin means that

other brands lost *fewer* customers than French brands.

The results are in Table 4 and Figure 7. The results generally confirm the conjecture that

Chinese brands gained market share from the French brands, and that other Western brands

suffered as much as French brands. During the first boycott phase, Chinese automobiles gained

a significant amount of market share relative to French brands in the months leading up to the

Olympics in August, in the range of 0.35 to 0.40 points during June through August. Cars from

other Asian countries (Japan and Korea) gained even more market share relative to French

brands, 0.92 points in July and 0.90 points in August (both significant).[56] The coefficients for

automobiles from Western European countries other than France[57] and from the US are

insignificant during the summer boycott. Given that French market share fell during that time,

we therefore do not reject the hypothesis that brands from other Western countries suffered just

as much. This finding is in accord with polls at the time indicating that the anti-French attitudes

spilled over into wide-scale anti-European/Western sentiment.[58]

The situation is largely similar during the second boycott phase, where again changes in

market share are relative to French brands. Chinese brands gain market share during November

(0.62 points) and December (0.60 points). Other Asian brands gain even more market share

during those months, including the largest gain of any country group or month, 1.37 points in

December. Other Western European brands gain share in November (0.63 points) but not in

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[56] It is not surprising that boycotters would also turn to Japanese and Korean automobiles, since Chinese officials were careful to include the rest of Asia in a spirit of cooperation in preparation for the Olympics. A Chinese Olympics official stated that the "Beijing 2008 Olympics is not only the glory of China, but also the glory of Asia," and Japan and Korea were strong supporters of the Beijing games (*People's Daily Online*, May 26, 2008, http://english.people.com.cn/90002/93687/93689/6418404.html).

[57] These countries and their brands are Germany (Audi, BMW, Benz,Volkswagen), Italy (Fiat), Sweden (Volvo), and the UK (MG).

[58] A survey shortly after the torch relay showed that attitudes of Chinese respondents fell toward the UK and Germany, as well as toward France (Zhou and Jia, 2008). Attitudes toward the US were not reported.

December, indicating perhaps that the anti-French sentiment did not turn into anger at all of Europe until the meeting with the Dalai Lama actually occurred and was defended in the Western press.[59] Changes in US market share are statistically indistinguishable from those for France. Unlike in the earlier boycott period, during the second boycott the "other" group (consisting mainly of imports), also saw an increase in market share in the last two months of 2008.

Since automobiles are durable goods and represent a major purchasing decision for most households, intertemporal substitution is another possibility for buyers. That is, consumers who want to purchase a Peugeot or a Citroën may delay their purchase to temporarily support the boycott but still buy their desired vehicle after the furor subsided. If intertemporal substitution were responsible for the large, significant decreases in market share during the boycotts found in estimations 1-5, then we would expect to see positive coefficients in those estimations for non-boycott months after April 2008 (i.e., September and October 2008 and January-March 2009). An examination of the coefficients for those months shown in Table 2 reveals no evidence of substitution of this sort. Not only are there no significant positive increases in market share during those months, the coefficients are in fact all (with one insignificant exception) negative.

Additional Evidence from Global Sales

While the boycott impacts documented above appear to be highly robust, one may wish to compare the experience of French automobiles in the Chinese market with their sales in other countries. For example, perhaps the sales decline is related more to PSA Peugeot Citroën than to a boycott in China. One could imagine estimating a triple-differences model, where the difference-in-difference (DID) impacts in China are themselves differenced from equivalent DID

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[59] In addition to the generally pro-Tibet Western European media, another reason why many Chinese may have conflated their views of France and Europe in general is that France held the rotating presidency of the EU at the time. Thus, the Chinese government responded to the French president's action in December by canceling a China-EU summit scheduled for that month.

estimates from another Asian country. However, Peugeot and Citroën are not domestically

produced and have minuscule market shares as imports elsewhere in Asia, and in any event, the

sales data required to perform such an estimation at the brand or model level are not available to

us. Nonetheless, we can check to see if the sales experience in 2008 in China for PSA Peugeot

Citroën at the market level was atypical.

  We gathered data from PSA Peugeot Citroën's annual report on the automobile markets

where the company has significant operations: Western Europe, Latin America, Russia, and

China.[60] Table 5 shows the percentage change in sales for the national automobile market and

for the company, as well as the difference between the two figures. The data show that the poor

sales performance (both absolutely and relative to competitors) during 2008 in China was highly

atypical. In China, sales of Peugeots and Citroëns were down 14.1% in 2008 compared to the

year previous, while the automobile market grew 5.1% year-on-year, for a difference-in-

differences of -19.2%.[61] In no other country or region did sales of the French brands decline

while sales in the market generally increased. In fact, in most parts of the world PSA Peugeot

Citroën outperformed the market, and only in the U.K. and Argentina (apart from China) is the

relative sales loss greater than 5% (where it is 5.4% and 5.3%, respectively). Thus, the 19.2%

sales losses relative to other brands in China is at least three and a half times higher than the

sales losses are in any other major market for the company. An informal triple-differencing,

computing by subtracting the other regions' DID figures from the Chinese DID (shown in the

final column of the table) returns excess sales losses by the French brands in China ranging from

13.5% (with respect to the UK) to 72.6% (with respect to Russia). These results show that

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[60] PSA Peugeot Citroën, *2008 Annual Results*, available at http://www.psa-peugeot-
citroen.com/document/publication/PSA%20RA%20POUR%20MISE%20EN%20LIGNE%20UK%2017%2002%20
091236112041.pdf. We include every country and region listed in the report.
[61] The sales statistics cover both passenger vehicles and light commercial vehicles, and so are not directly
comparable to our microdata.

companywide problems with PSA Peugeot Citroën cannot account for the Chinese sales declines in 2008.

7. Conclusion

The investigation of the brand and model level data with the difference-in-difference methodology uncovers a robust pattern of boycott effects on sales of French automobiles in China during 2008. The effects of the first wave of market-mediated protest, triggered by the disruption of the Olympic torch relay in Paris, started small but grew steadily through the month of the Beijing Olympics. The second wave, occurring in November and December of 2008 when the French President met with the Dalai Lama, was shorter yet sharper in impact. Our results show that the impact of the boycotts is substantial: market share of French automobile brands fell 25-33% over the two boycotts, relative to trends for other brands. The supplementary estimations looking at brand log sales return even larger magnitudes, with boycott impacts of up to -66%. Evidence from a matched sample at the model level points toward the largest impacts of all, of up to -155%. We also find clear evidence that Chinese consumers substituted away from Frenchbrands toward Chinese and other Asian brands but not toward other Western automobile brands, in accord with the anti-Western penumbra surrounding the boycotts of French goods.

Our research design enables us to dismiss many alternative explanations for the decline in sales of French automobiles in 2008. By using a difference-in-difference strategy with fixed effects for time and brand (and model, where appropriate), we are able to rule out all factors (even those that change over time) that affect the market generally. The results are not sensitive to the span of the sample, whether it is the balanced two-year sample used in most estimations or the complete dataset. Differences in vehicle attributes among brands or models, or between Chinese and other vehicles, do not appear to drive the results. Any alternative explanation involving fuel prices or changing tastes for economy must confront the fact that vehicles from

Korea and Japan, which gained market share from French brands, have worse fuel efficiency. Similarly, any alternative explanation involving the impact of the global financial crisis on income or consumer confidence must confront the fact that, on average, French cars are priced less than others are (see Figure 6). In fact, our matched sample that most directly ensures the comparability of the control group of automobiles yields the largest boycott impacts of all. Finally, the French automaker that partners with the domestic firm (Dongfeng Shenlong) to produce the vehicles in China experienced such large sales declines nowhere else in the world at the time. We cannot incontrovertibly rule out that there is another reason such as quality changes causing the lost sales. However, our search of the Chinese trade press did not uncover explanations besides the boycotts that would have caused Chinese consumers to stop buying French brands precisely when nationalistic fervor was at its peak.[62] In the face of the evidence presented here, Occam's razor indicates that the boycotts, as the simplest explanation, are likely to be the correct one.

Even though the French companies owned less than half of the joint venture that produced Citroëns and Peugeots in China, the empirical results suggest that many Chinese consumers viewed these brands as French. The ironic result is that the larger part of the blow from the second boycott—prompted by diplomatic actions of the French government—fell on Dongfeng, a Chinese firm. One response of the automakers would be to pursue a business strategy to invest in brand localization to stave off future episodes of losing profit over diplomatic incidents out of the firm's control. In the US, for example, Toyota has chosen to "Americanize" both to better appeal to consumers here and to insulate itself against political reprisals stemming from success at the expense of the Detroit auto companies (Taylor, 2003).

To the extent that Chinese consumers viewed the boycott as instrumental, the market-mediated protests appear to have been successful. In April 2009, China and France resumed a

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[62] See footnote 37, for example.

spirit of economic cooperation and agreed to restore high-level diplomatic contact following the

quarrel over Tibet. France furthermore pledged not to support Tibetan independence (Bodeen,

2009). Scholars have previously noted that boycotts can serve as surrogate regulation,

substituting for formal governmental intervention in the market (e.g., Gunningham, Phillipson,

and Grabosky). However, the context of this line of inquiry in the literature has been regulation

of product safety or environmental damage. In the case we examine, the government did not

support the boycotts at the times they had the largest impact on sales, probably because it feared

counter-boycotts of Chinese goods abroad and certainly because it realized that international

trade and FDI are not zero-sum games. The boycotts were one factor among several, no doubt,

causing France to re-evaluate its position. China was also exerting diplomatic and economic

pressure by canceling an EU summit and shunning France while on investment missions in

Europe (Bodeen, 2009). Nevertheless, our work suggesting that boycotts can help achieve their

ultimate goals, even when those goals involve foreign policy and relations between nations,

implies that commerce can be an effective weapon, even when wielded through the means of

private collective action. In short, our answer to the question posed by Ashenfelter, Ciccarella,

and Shatz (2007) is that politics really does affect commerce.

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A   Appendix

As noted in the text, the difference-in-difference impacts of the boycotts presented in the tables are relative treatment effects, in the sense that β in equation (1) in the text measures the change in the gap between market shares between the French and other brands. When the boycott causes French market share to change, the market share of non-French brands perforce changes, since the shares always sum to 100%. There is thus, in a sense, some double counting in β, since when sales lost by French brands are picked up by non-French brands, not only does French market share drop, but non-French market share rises. Instead of the relative treatment effect β, the reader may be interested in what we might call the "absolute" treatment effect, a difference-in-difference estimate where any change in the market shares of non-French brands due solely to the treatment are removed. The absolute treatment effect is more in line with how researchers usually think about difference-in-difference estimates, where the control group is assumed to be unaffected—even indirectly—by treatment. In this appendix, we show that in the present application the relative and absolute treatment effects are close enough that it makes little difference which is used.

Given that the difference-in-difference setup removes both differences in pre-treatment levels of the dependent variable between the treatment and control groups, as well as any change in the dependent variable before and after treatment not due to the treatment effect, for explication here we take both of these to be zero. Let Q_0 and Q_1 be the total market quantities during the treatment period in the (counterfactual) no-treatment case and the (actual) treatment case, respectively, and denote these same quantities for brand i as q_{i0} and q_{i1}. Then, define the absolute treament effect as the change in units sold for the French brands (expressed in terms of market share):

$$\Delta m_i \equiv (q_{i1} - q_{i0}) / Q_1 \tag{A1}$$

Define the index set $I_F = \{1, 2\}$ for the two French brands, and let the average absolute treatment effect

for the French brands be denoted

$$\overline{\Delta m}_F \equiv \frac{1}{2} \sum_{i \in I_F} \Delta m_i \tag{A2}$$

Let $I_{NF} \equiv \{3, \ldots, k+2\}$ be the index set for the k non-French brands. How the difference-in-difference estimates of β from equation (1) compare with $\overline{\Delta m}_F$ depend on whether sales lost by the French brands are picked up by other brands or whether the market shrinks. We consider the two (polar) cases in turn, to suggest what the bounds on the difference between the absolute and relative treatment effects might be. It turns out that in either case the difference is very small.

A.1 Case 1: sales lost by French brands go to other brands

When the treatment causes sales to be redistributed among firms with no change in market quantity, we have $Q_0 = Q_1 \equiv Q_\bullet$. Let $\Delta q_F = \sum_{i \in I_F} (q_{i1} - q_{i0})$ be the total change in sales of the French brands, so that the other brands gain $-\Delta q_F$ units collectively. Then the average Δm_i for non-French brands is

$$\overline{\Delta m}_{NF} = \frac{1}{k} \sum_{i \in I_{NF}} \Delta m_i = -\frac{1}{k} \frac{\Delta q_F}{Q_\bullet} = -\frac{2}{k} \overline{\Delta m}_F \tag{A3}$$

where the final equality follows from the identity $\overline{\Delta m}_F = \Delta q_F/(2Q_\bullet)$ in this case.

The difference-in-difference coefficient from regression (1) measures the relative treatment effect:

$$\beta = \overline{\Delta m}_F - \overline{\Delta m}_{NF} \tag{A4}$$

(since the unit of observation in the estimations is a brand, thinking in terms of brand-level averages is appropriate for this exercise). Substituting equation (A3) into (A4) and solving for the absolute treatment effect yields

$$\overline{\Delta m}_F = \left(\frac{k}{2+k}\right) \beta$$

The expression shows that the impact of the double counting can be large if there are few non-French brands. With the same number of French brands as other brands, β would overstate the absolute treatment

effect by a factor of two. However, in our data, $k = 55$. Thus, if one wishes to think about the treatment effect on French brand market share in absolute rather than relative terms, the results in Table 2 need only be adjusted downward (in magnitude) by multiplying by $55/57 = 0.965$. Such scaling is negligible compared to the width of the confidence intervals in Table 2. For example, in estimation 1, β_{49} (the largest estimate) is -0.539, which after scaling produces $\overline{\Delta m}_F = -0.520$, which is an immaterial change compared to the 95% confidence interval for β_{49} of $[-0.825, -0.253]$.

A.2 Case 2: sales lost by French brands contract the market

When the treatment causes French sales to evaporate, reducing the market size one for one, the difference between the relative and absolute treatment effects are even smaller than in case 1 (although the calculations are more tedious). In this case, we have $q_{i0} = q_{i1} = q_{i\bullet}$ for non-French brands, and $Q_1 = Q_0 + \Delta q_F$. With Q_1 no longer equal to Q_0, regression coefficient β can no longer be written as in equation (A4), but instead must be written out as the difference in how the market shares of the French and other brands change due to the treatment:

$$\beta = \frac{1}{2} \sum_{i \in I_F} \left(\frac{q_{i1}}{Q_1} - \frac{q_{i0}}{Q_0} \right) - \frac{1}{k} \sum_{i \in I_{NF}} \left(\frac{q_{i\bullet}}{Q_1} - \frac{q_{i\bullet}}{Q_0} \right) \tag{A5}$$

It is convenient to note that

$$\frac{1}{Q_0} - \frac{1}{Q_1} = \frac{Q_1 - Q_0}{Q_0 Q_1} = \frac{\Delta q_F}{Q_1} \frac{1}{Q_0} = \frac{2}{Q_0} \overline{\Delta m}_F \tag{A6}$$

where the final equality follows from (A1). Define $\bar{q}_{0F} = (q_{10} + q_{20})/2$. The first term on the right side of (A5) can be written

$$
\begin{aligned}
\frac{1}{2} \sum_{i \in I_F} \left(\frac{q_{i1}}{Q_1} - \frac{q_{i0}}{Q_0} \right) &= \frac{1}{2} \sum_{i \in I_F} \left(\frac{q_{i0} + (q_{i1} - q_{i0})}{Q_1} - \frac{q_{i0}}{Q_0} \right) \\
&= \frac{1}{2} \frac{\Delta q_F}{Q_1} + \left(\frac{1}{Q_1} - \frac{1}{Q_0} \right) \bar{q}_{0F} \\
&= \left(1 - 2 \frac{\bar{q}_{0F}}{Q_0} \right) \overline{\Delta m}_F \tag{A7}
\end{aligned}
$$

where the final equality follows from equation (A6). The second term on the right side of equation (A5) can be written

$$\frac{1}{k} \sum_{i \in I_{NF}} \left(\frac{1}{Q_1} - \frac{1}{Q_0} \right) q_{i\bullet} = -2 \frac{\bar{q}_{NF}}{Q_0} \overline{\Delta m}_F \tag{A8}$$

where $\bar{q}_{NF} = \sum_{i \in I_{NF}} q_{i\bullet}/k$ and again we make use of equation (A6). Substituting (A7) and (A8) into equation (A5) and solving for $\overline{\Delta m}_F$, we have

$$\overline{\Delta m}_F = \left[1 + 2 \left(\frac{\bar{q}_{NF} - \bar{q}_{0F}}{Q_0} \right) \right]^{-1} \beta \equiv s\beta$$

Using data from the pretreatment period, we calculate a scaling factor of $s = 0.991$. Thus, to convert the treatment effect from relative to absolute terms, the necessary adjustment for case 2 is even smaller than in case 1.

Table 1: Recent Boycotts from around the World

Title	Time	Place	Sponsor	Target	Stated Reason
Fire Hollywood	2003	USA	PABAAH	certain film makers and pop-culture figures	Hollywood figures are unpatriotic because of opposition to the Iraq war
Nestlé boycott	since 1977	USA & Europe	various groups	baby milk	Promotion of infant formula over breast-feeding has led to health problems among infants in LDCs.
Great American Boycott	May 1, 2006	USA	US immigrants from Latin America	United States schools and businesses	A proposed US bill discriminating against illegal immigrants and funding the construction of new border security fences along the US–Mexico border.
Stop Esso campaign	since 2001	Universal	Greenpeace *et al.*	Esso (ExxonMobil in the United States)	Esso is not investing in renewable energy sources, denies the existence of global warming, and undermines the Kyoto Protocol.
Boycott Cheetos	2008	USA	concerned parents and teachers	Frito-Lay's 2008 advertising campaign	Frito-Lay company's 2008 advertising campaign equating vandalism with being "cool."
Nokia boycott	Jan 2008	Germany	Unions in Germany	Nokia's cell phones	Nokia's decision to move production sites in Germany to lower-cost regions in Eastern Europe
Consumers Boycott Nokia, Siemens	June, 2009	USA	Consumers	Nokia & Siemens	The companies' joint networking firm sold sophisticated internet surveillance equipment to Iran.
Spanish fury over Chinese shoes	Sep 2004	Spain	Protesters	Chinese shoes	Competition from Chinese shoes is damaging Spanish manufacturers.
boycott of Israeli goods	2009	European countries	European Consumers	Israeli Products	Israeli's attacks on Gaza
Truckers' boycott of Chinese store-owners	2006	Argentina	truckers union of Argentina	supermarkets owned by Chinese people	Retaliation for the attack of a trucker by a Chinese store-owner
Turkey boycott of Chinese goods	2009	Turkey	Turkey's industry and trade minister	Chinese goods	July 2009 Ürümqi riots
Boycott calls over bomber release	2009	USA	USA's Consumers	Scottish goods	The Scottish and UK governments committed a "flagrant betrayal" of US by releasing Lockerbie bomber Abdelbaset Ali al-Megrahi.
Campaign to boycott US goods	2009	Malaysia	Malaysian Muslim Consumers Association	Jewish and American goods	US' policies on anti-terrorism and Israel's attacks on Palestine
Chinese toys boycott	2007	Australia, USA & Europe	Parents	toys made in China	Dangers of lead paint on toys or of small parts that could lead to a child's death.
Chocolate Boycott	2007	England	Archbishop of York	Chocolate not cert-ified as Fair-trade.	Fair-trade chocolate would help to end child labor.
Ban of Canadian seafood	Oct, 2009	European countries	Anti-seal-hunt group	Canadian seafood	The sealing industry in Canada.
Save the whales	2006	IRISH	IRISH consumers	Japanese goods	Japanese whaling.

Source: Authors' research.

Table 2: Basic Estimation Results

y_{it}: market share x 100	(1) Basic estimation		(2) Car characteristics added		(3) Country-specific time trends	
	Coefficient estimate (robust s.e.)	Implied variation (%)	Coefficient estimate (robust s.e.)	Implied variation (%)	Coefficient estimate (robust s.e.)	Implied variation (%)
B_{41}: Apr 08	-0.166 (0.230)	-8.58	-0.220 (0.266)	-11.37	-0.245 (0.184)	-14.77
B_{42}: May 08	-0.169* (0.090)	-8.78	-0.232 (0.147)	-11.93	-0.239** (0.093)	-14.47
B_{43}: Jun 08	-0.237** (0.093)	-12.27	-0.285** (0.132)	-14.75	-0.232* (0.123)	-14.73
B_{44}: Jul 08	-0.394*** (0.140)	-20.31	-0.451*** (0.148)	-23.17	-0.375* (0.193)	-23.88
B_{45}: Aug 08	-0.493*** (0.141)	-25.41	-0.466*** (0.113)	-24.99	-0.398** (0.179)	-26.6
B_{46}: Sep 08	-0.113 (0.174)	-5.85	0.019 (0.252)	1.07	-0.074 (0.220)	-4.84
B_{47}: Oct 08	-0.260 (0.178)	-13.46	-0.230 (0.206)	-12.4	-0.232 (0.209)	-14.91
B_{48}: Nov 08	-0.511*** (0.135)	-26.29	-0.572*** (0.176)	-29.25	-0.469*** (0.174)	-30.21
B_{49}: Dec 08	-0.539*** (0.143)	-27.71	-0.623*** (0.194)	-31.47	-0.511** (0.221)	-32.58
B_{50}: Jan 09	-0.194 (0.180)	-10.03	-0.271 (0.183)	-13.77	-0.170 (0.251)	-10.86
B_{51}: Feb 09	-0.265 (0.197)	-13.66	-0.351 (0.230)	-17.76	-0.243 (0.274)	-15.49
B_{52}: Mar 09	-0.153 (0.178)	-7.91	-0.227 (0.206)	-11.58	-0.139 (0.268)	-8.83
Vehicle characteristics:	not included		included		included	
Country-specific quadratic trends:	not included		not included		included	
Period	Apr 2007-Mar 2009		Apr 2007-Mar 2009		Dec 2004-Mar 2009	
Number of obs	1,355		1,189		2,289	

* 10% significance level   **5% significance level   ***1% significance level

Table notes: all specifications include two-way fixed effects for brand and month. Std. errors

are robust to heteroskedasticity and clustering on brands.

Table 3: Estimations with Alternative Dependent Variable

y_{it}: log(quantity sold)	(4) Basic estimation	(5) Car characteristics added	(6) Matched sample of models
	Coef. estimate (robust s.e.)	Coef. estimate (robust s.e.)	Coef. estimate (robust s.e.)
B_{41}: Apr 08	-0.147	-0.303**	-0.254**
	(0.179)	(0.133)	(0.124)
B_{42}: May 08	-0.072	-0.298**	-0.473*
	(0.105)	(0.148)	(0.250)
B_{43}: Jun 08	-0.219***	-0.365**	-1.067**
	(0.077)	(0.167)	(0.480)
B_{44}: Jul 08	-0.366***	-0.525**	-0.983
	(0.140)	(0.254)	(0.601)
B_{45}: Aug 08	-0.331*	-0.587**	-1.023*
	(0.187)	(0.233)	(0.596)
B_{46}: Sep 08	0.107	0.106	-1.118*
	(0.181)	(0.264)	(0.622)
B_{47}: Oct 08	-0.096	-0.247	-0.918
	(0.168)	(0.265)	(0.613)
B_{48}: Nov 08	-0.351**	-0.348	-1.266**
	(0.142)	(0.234)	(0.601)
B_{49}: Dec 08	-0.448***	-0.657**	-1.548**
	(0.161)	(0.285)	(0.756)
B_{50}: Jan 09	-0.014	-0.039	-0.634
	(0.110)	(0.192)	(0.770)
B_{51}: Feb 09	-0.083	-0.102	-0.787
	(0.122)	(0.265)	(0.872)
B_{52}: Mar 09	0.031	0.098	-0.733
	(0.108)	(0.225)	(0.912)
Unit of observation	brand	brand	model
Vehicle characteristics	not included	included	subsumed in fixed effect
Chinese models	included	not included	included
Number of obs.	1,212	523	1,384

* 10% significance level   **5% significance level   ***1% significance level

Table notes: all specifications include two-way fixed effects for brand or model and month. Std.

errors are robust to heteroskedasticity and clustering on brands (in estimations 4 and 5) or

models (in estimation 6). The period is April 2007 to March 2009.

Table 4: Substitution estimation

y_{it}: market share x 100	Estimated Coefficients (points of market share gained relative to French automobile sales)				
Month	China	Asia	W. Europe	US	Other
$B_{k,41}$: Apr 08	0.24	0.27	0.26	-0.04	0.32
$B_{k,42}$: May 08	0.23	0.62***	-0.09	-0.09	0.12
$B_{k,43}$: Jun 08	0.35***	0.58*	-0.17	-0.13	0.26**
$B_{k,44}$: Jul 08	0.45***	0.92***	-0.21	0.29	0.29**
$B_{k,45}$: Aug 08	0.40***	0.90***	0.27	0.23	0.35***
$B_{k,46}$: Sep 08	0.01	0.40	-0.41	-0.50	-0.10
$B_{k,47}$: Oct 08	0.29	0.59*	-0.12	-0.31	0.07
$B_{k,48}$: Nov 08	0.61***	0.91**	0.53**	-0.10	0.53***
$B_{k,49}$: Dec 08	0.57**	1.38***	0.11	0.30	0.57***
$B_{k,50}$: Jan 09	0.41*	0.12	-0.23	0.27	0.03
$B_{k,51}$: Feb 09	0.57**	0.02	-0.24	0.36	0.10
$B_{k,52}$: Mar 09	0.38	-0.05	-0.12	0.19	0.14

* 10% significance level   **5% significance level   ***1% significance level

Table notes: $N = 1,164$. Estimation includes two-way fixed effects for brand and month and

vehicle characteristics. Significance is calculated from std. errors that are robust to

heteroskedasticity and clustering on brands.

Table 5: Automobile sales in 2008 around the world (percent change from previous year)

Region/Country	PSA Peugeot Citroën	Entire Market	Difference in Differences (DID)	Difference in DID (DDD)
China	-14.1	5.1	-19.2	NA
Russia	67	13.6	53.4	-72.6
Western Europe	-8.6	-8.8	0.2	-19.4
France	1.9	-0.6	2.5	-21.7
Germany	2.1	-1.7	3.8	-23
Spain	-30.0	-29.8	-0.2	-19
UK	-17.1	-11.7	-5.4	-13.8
Italy	-12.5	-12.7	0.2	-19.4
Latin America	5.4	2.0	3.4	-22.6
Mercosur countries	11.9	13.0	-1.1	-18.1
Brazil	17.7	14.1	3.6	-22.8
Argentina	2.5	7.8	-5.3	-13.9

Table notes: Figures are the sales of passenger and light commercial vehicles in 2008, expressed as percentage change from 2007. Figures in column 4 are calculated as the DID figure from column 3 less the DID figure for China, and represent the triple-difference of sales in China with respect to time, the rest of the Chinese market, and the same comparison in the other national market. Source: PSA Peugeot Citroën's 2008 annual report.

Figure 1: Count of Chinese newspaper articles on the boycotts
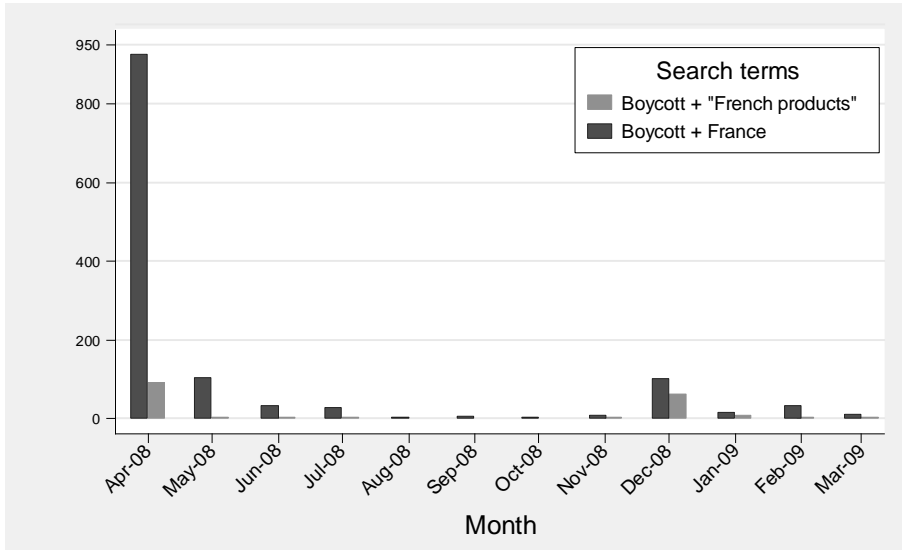
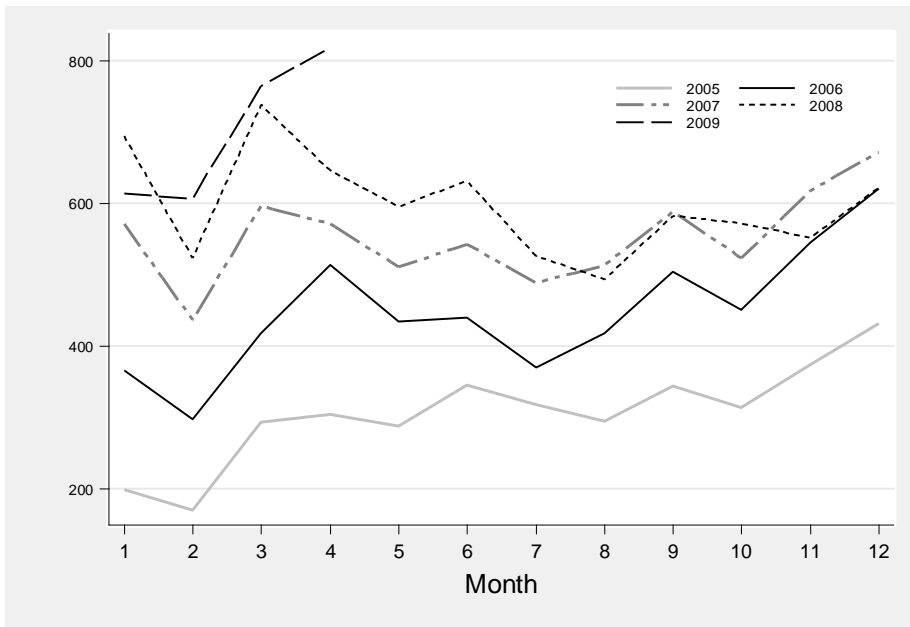**Figure 2: Automobile Sales in China by Year**
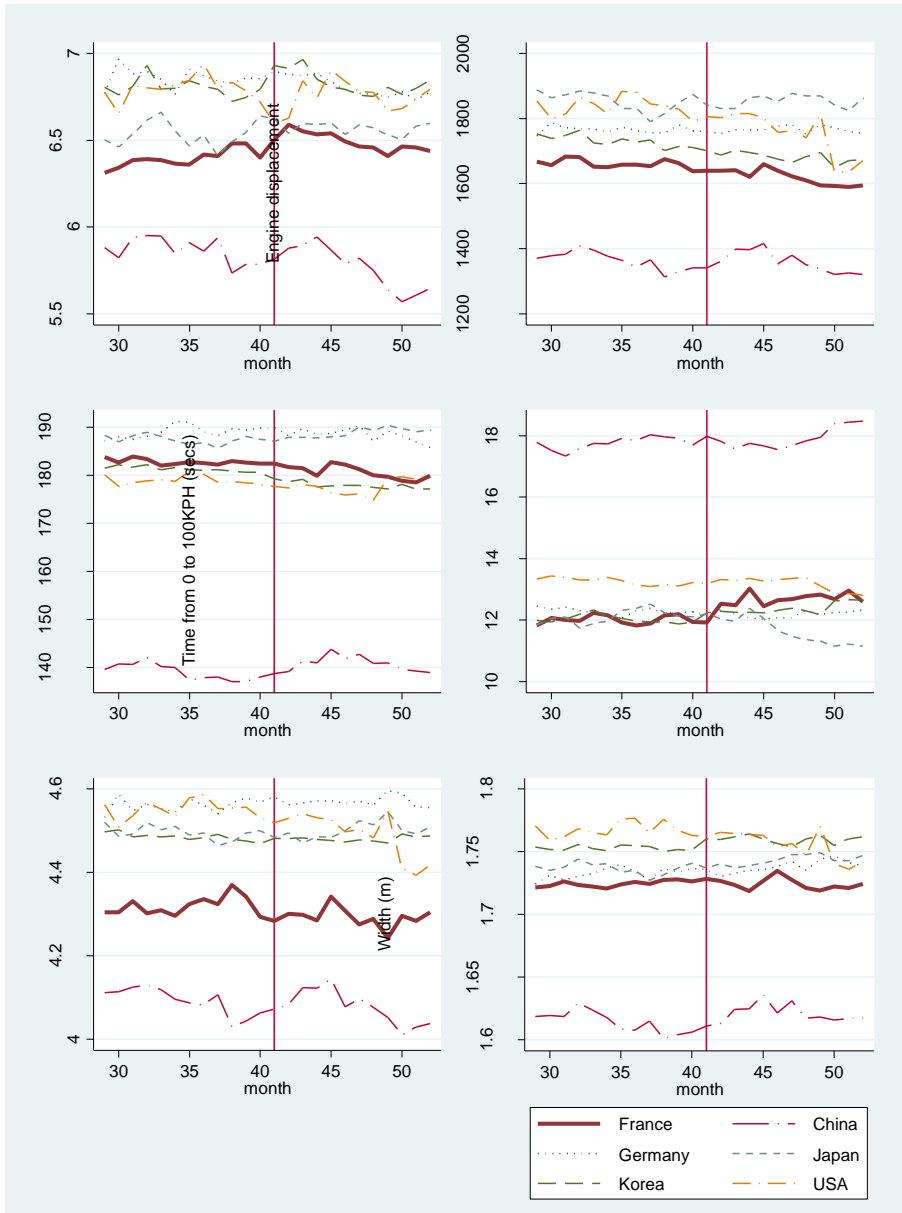
Figure 3: Vehicle characteristics, national averages

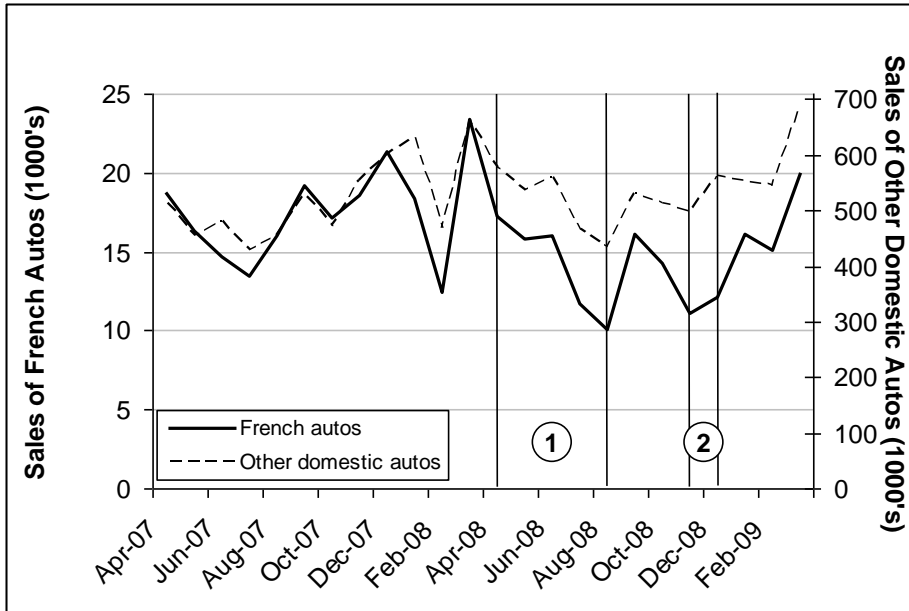**Figure 4: Sales of French and Other Automobiles Before and After the Boycotts**

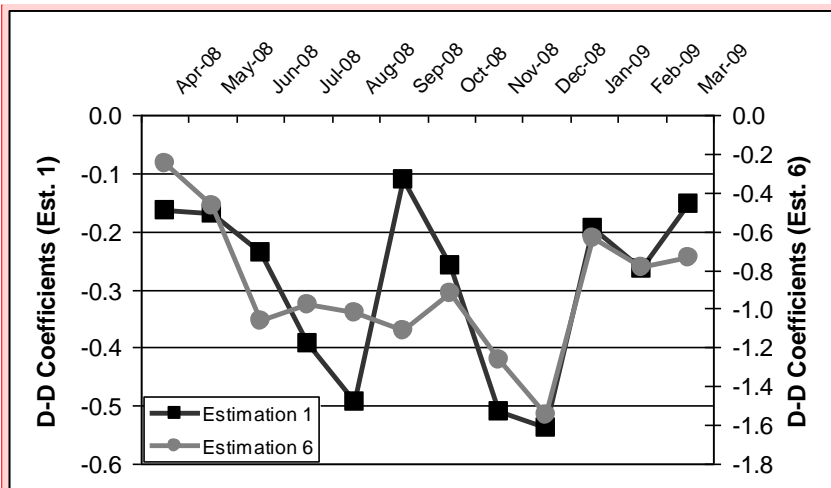**Figure 5: Estimated Effects of the Boycotts**

Figure 6: Price trends
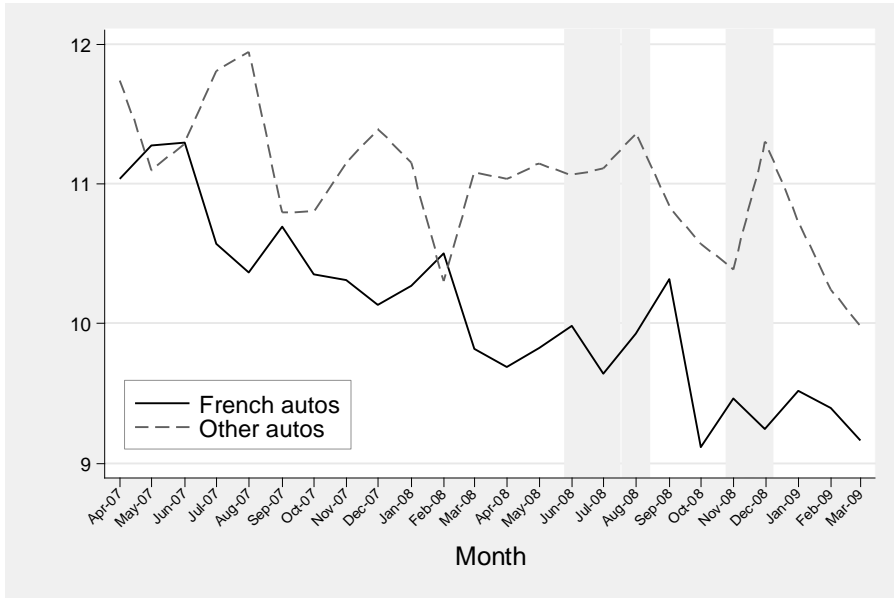
Figure 7: Substitution patterns