4-24-2009

Is There Country-of-Origin Bias in the Video Game Market?

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April 24, 2009

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Abstract: This paper tests for the existence of country-of-origin bias in the video game market. Using aggregate sales data from Japan and the US, I measure the effect of country-of-origin on video game sales in each respective country while controlling for genre, system, quality, and target age group, as well as domestically targeted games and superstar effects. I find that a significant country-of-origin bias exists in both game markets in favor of domestic titles.

Introduction

The video game industry is one of the fastest growing entertainment markets in the world. It reaches across borders and brings new experiences to consumers, but often domestically produced games see the most success at home. In the Japanese market, games produced domestically sell better than games from the United States, even when games produced in the US are of similar quality; the reverse is true of Japanese games in the US market. In a young and growing market like video games, understanding what consumers choose to play and why is important. Without understanding the reasons behind this country preference or attempting to overcome the divisions it presents, game developers could limit themselves unnecessarily by focusing on one market, when the dominating network and economy of scale effects in the industry should drive developers to target consumers globally in order to maximize profits.

All products are characterized by a set of cues that elicit reactions from consumers. These cues can range from color to how quickly a machine brews a cup of coffee. In the case of goods produced abroad, the cues are compounded by their 'foreign' nature. So when a product has many and complex cues, consumers may try to simplify or reduce the number of cues, often by purchasing domestically produced goods (Balbanis and Diamantopoulos, 2004; Bilkey and Nes, 1982; Eroglu and Machleit, 1989). A domestic country bias affects people's perceptions about the quality of a product, and thereby also affects sales. This paper documents the existence of this bias and examines to what degree it affects sales in the video game market.

After controlling for video game characteristics, I find a significant and negative country-of-origin [COO] bias in game sales performance in foreign markets. Results are robust to specification changes, with a negative bias against American games in the Japanese market and a still significant, but somewhat smaller bias in American markets against Japanese games. These biases account for several hundred thousand units of game sales. Decomposing the differences using a Oaxaca-Binder decomposition finds that only a small portion of the difference in sales is explained by video game characteristics in the Japanese market, and that in the American market the same holds true, though the explained portion is larger.

Section 2 briefly reviews the literature regarding country of origin bias as it applies to this paper. Section 3 develops the theory used to explain how consumers make their purchasing decisions. Section 4 explains the data used in the regressions, which includes sales data for games in both countries, as well as game characteristics. Section 5 concludes with results and discusses their implications.

Section 2. Literature Review

Video games are an industry where different products are weak substitutes for one another (Nair, 2007). In addition, there are clear ways of breaking down the product into identifiable categories (Williams, 2002).[1] For example, one might characterize a game by its genre, such as 'Fighting' or 'Racer,' or by the system on which it operates, such as the GameCube or Playstation 2. Given that games are weak substitutes, even two games of the same genre for the same systems can differ, and differing countries of origin provide consumers with an easy basis of comparison. The COO affects many cues available to consumers, such as the art style of the game and its packaging, the title of the game, and even the style of the game within its genre (American role-playing games (RPGs) differ from Japanese RPGs, for example).

[1] For an in-depth review and analysis of the video game industry, please see Crandall and Sidak (2006) and Williams (2002).

In the video game market, the effect of COO bias on sales is clear when one breaks down the purchasing decision by the cues available to the consumer.

Products contain many cues that play a central role in representing the product to the consumer. In the case of a video game, cues include what type of game it is and how it plays (genre), the console on which it runs, the age-appropriateness of the title, its review score in the press, etc. (Williams, 2002). These cues have a significant impact on a consumer's perception of the individual product, more so than price or brand name (Bilkey and Nes, 1982; Heslop, Liefield and Wall, 1991). People's perceptions of these cues change for products from different countries across specific industries and product categories. Previous literature finds a preference for domestic goods, likely due to cultural differences; additionally, differentiating the prices to make one more appealing than the other does not change that preference (Nagashima, 1970; Balbanis and Diamantopoulos, 2004). Thus, people will make purchasing decisions about two children's puzzle games for the Nintendo GameCube based on whether they came from Japan or the US, regardless of which one is cheaper.

However, focusing on only one cue, country-of-origin, leads to surveying a wide panel of countries and a wide variety of products. The effect of COO can vary across industries and generate spillover effects (Bilkey and Nes, 1982). If COO is the only cue measured, a multi-country comparison shows only the relative perceptions of different COOs, which are not quantifiable. The results demonstrate a clear COO bias, but being unable to calculate the effects of the bias or to analyze specific industries for the effects of bias limits their applicability (Heslop, Liefield and Wall, 1991). An ideal method for examining COO effects is to analyze an interaction between two countries producing in one product category with complex goods to identify the impact of country bias (Balbanis and Diamantopoulos, 2004). This way, the research can show the effect of the available informational cues (for video games: genre, target age group, quality, etc.) when combined with the COO cue.

In a multi-cue situation, like when purchasing a video game, consumers will use simplified signals of information, such as COO, to determine the quality of a product (Eroglu and Machleit, 1988). Using cues to measure people's preferences will draw out the effects of COO bias; e.g., contrasting people's purchasing decisions between two similar games with different COOs will show the effect that being either from Japan or the United States has on which game people choose. Comparing these similar but differentiated goods shows the benefits of specific product analysis to determine what the effects of COO bias are (Balbanis and Diamantopoulos, 2004).

Differentiation within the product category is important. When comparing the purchasing patterns of homogenous goods traded in large quantities within an industry, COO bias does not affect patterns of exchange or perceptions of quality, as homogenous goods are considered to be of equal quality, regardless of COO (Evans, 2001). The complexity of the examined products leads consumers to break down what they can perceive and to use that information to guide their decisions (Eroglu and Machleit, 1988). In an industry like video games, consumers need these informational cues to help them to understand the product's complex nature, emphasizing the effects of COO bias. Product categories with salient cues and interpretable levels of quality are more likely to be the subjects of COO bias (Bilkey and Nes, 1982; Heslop, Liefield and Wall, 1991; Balbanis and Diamontopoulus, 2004).

Consumer ethnocentrism helps to explain some of the variability in preferences when analyzing domestic country bias, but its effect varies depending on the specific country and product category. Consumer ethnocentrism causes products from similar cultures to be viewed more favorably, whereas domestic country bias extends only so far as nationally made goods, regardless of culture (Balbanis and Diamantopoulos, 2004). The difference is that consumer ethnocentrism results from cultural biases (e.g., preference for English), while domestic country bias is a nationalistic bias (e.g., preference for American goods). Domestic country bias occurs regardless of a consumer's level of ethnocentricity, and COO is the main source of bias towards a product. It is not possible to separate the effects of the two within the two-country setup used by this paper, but consumer ethnocentrism helps to explain how COO affects the way people perceive the cues of foreign and domestic products when the foreign product closely resembles the domestic one.

A negative reputation of products from a specific country may affect perception regardless of differences from other products in the market (Lampert and Jaffe, 1998). In this way, brand reputation and country interact because an initial perception can expand and affect other producer brands with the same COO in a product category (a "Halo" effect).[2] The perception of a country can lead consumers to assume that all products from that specific country have similar attributes, thereby perpetuating and increasing the effect of COO bias within an industry (Lampert and Jaffe, 1998).

I intend to extend the research of COO effects into a multi-cue analysis of one product category. This will fill the gap in empirical research on the effects of COO bias and its effect on a major industry in which Japan and the United States are leaders. Identifying and quantifying

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[2] This effect is exemplified by the Halo series of video games for the Microsoft X-Box. The series consists of high-action, first-person view gun battles and war scenes, which are generally more popular in the US than in Japan. It was also the iconic game of Mircosoft's system, as Mario games are to Nintendo systems. This association of Halo the game to the X-Box could have led to the belief that *all* games for the X-Box were similar to Halo. This perception may have caused a decrease in sales for other X-Box titles in Japan, as they were perceived to be of the same brood.

the effect of COO bias will provide solid evidence of its material effects in an industry of complex, multi-cue goods.

Section 3. Theory

In the video game market, where the goods are complex and are weak substitutes (Nair, 2007), COO will be more significant in the decision to purchase a game. As products become more complex, consumers break down quality cues into the most easily accessible information available and COO begins to play a more significant role in the consumer's decision with increases in product complexity (Eroglu and Machleit, 1988). I assume that consumers are making their decisions based on preferences for the available cues, but that COO bias has a significant impact on video game sales separate from the effect of the available cues.

I consider COO bias to consist of the factors not accounted for by genre, system, quality, or target age group, the most easily available cues for video games. These are all available to the consumer on the physical packaging of the game, which I assume is their only source of information along with access to game reviews. COO bias is a preference for perceived desired qualities within a game based on its COO, whether or not these qualities are present in the game itself. COO bias incorporates the perceptions of a specific country's products in a way that affects consumption, such as the Halo effect (Lampert and Jaffe, 1998). Thus, perceptions and opinions are a significant factor in determining the extent of COO bias present.

In order to test for the presence of bias, I assume that consumers are maximizing their utility in the following function:

$$U = f(G,C)$$

where U is the utility derived from consumption of goods, G is video game consumption, and C is all other goods. The consumption of video games is then a function of:

$$G_i = f(COO, Genre, System, TAG, Quality)$$

where COO, genre, the system with which the game is compatible, a game's target age group (TAG), and quality act as the indicators used when consumers make a purchase, and income is exogenous. I assume that consumers are maximizing their utility derived from video game consumption using the information provided by the available cues and determining the expected utility of playing game *i*. Thus, game sales should be a reflection of consumers maximizing their utility within these cues.

I also assume that prices are equal across video games, regardless of the console for which they were released. This is reasonable, as almost all video games released in the United States over the generations of consoles used in this paper had a price of $50. This price was largely uniform, regardless of differences in development or other costs and was not passed on to consumers in the form of differing price points.[3] There were occasional releases at $40, but these were mostly low-budget titles, which are generally not included this paper's dataset. The Japanese market functions similarly, with video games releasing within a general range of $60 to $75 when converted from yen. Prices in Japan are relatively uniform, comparable to those in the United States. Additionally, video games release at a high price point to target pent-up demand, and when that demand has declined, the price is then reduced to target the remaining consumers who wish to purchase the game, but only at the lower price (Nair, 2007; Orbach and Einav, 2007). Once these consumers have purchased the game, sales decline to insignificant levels and the game has reached the end of its sales run. Thus, I assume that games released on the

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[3] The current tariff levels on video games both imported and exported to and from Japan and the United States are 0% in all cases (WTO, 2009).

generations of consoles used in this paper have accumulated all of their potential sales at equal prices.

I anticipate that the COO variable is positive when the COO is the same as that of the domestic market. Additionally, the quality of a game should correlate positively with sales, as I assume people want to play games that are more likely to be enjoyable. A negative and significant coefficient on COO when it is equal to "American" in the Japanese market would indicate the presence of bias. System and genre are categorical cues, and each category should vary, so each specific effect is a result of consumer preferences and does not have a theoretically predicted sign. Target age group should act in the same way, though there is evidence that mature-content media does not perform as well as more accessible content (Einay, 2007).

Section 4. Data

In order to study the effects of domestic country bias in the video game market, I collected data from three generations of home video game consoles.[4] For country-of-origin, game genre, video game system, and individual game unit sales numbers for both the United States and Japan, I compiled data from VG Chartz, which provides data collected from company production and shipment information and compares them to available industry unit sales data for the United States, Japan and Europe. Japanese quality ratings consist of *Famitsu* review scores, as it is the most recognizable industry publication in Japan (Thorsen, 2006).[5] *Famitsu* reviews

[4] I use data from the fourth (1988-1996), fifth (1994-2002), and sixth (1998-2008) generations of video game consoles, which spans Super Nintendo Entertainment System and Sega Genesis through the Nintendo Gamecube, Microsoft X-Box and Sony Playstation 2. I use the most prominent systems of each generation to account for the accrued network effects associated with success, which requires dropping the Sega Saturn and Sega Dreamcast due to their poor comparative sales figures and small game libraries. For a more complete explanation, please see Williams (2002).

[5] Website: http://www.famitsu.com/

consist of four reviewers who play the entirety of a game and rate it based on their impressions of its controls, graphics, sound, presentation, and their overall opinion of it as a product. For quality ratings in the US and target age group, I used GameStats, which collects and averages review scores across industry publications, both online and in print.[6] Ratings on GameStats come from major print and web publications that review games, and these publications function much the same way as *Famitsu*, focusing largely on the quality of a game's graphics, sound, controls, overall level of polish (presence of software glitches, etc.), and a professional opinion of how enjoyable it is, with varying numbers of reviewers.[7] GameStats also provides the Entertainment Software Rating Board (ESRB) rating for most games, which rate a game's age-appropriateness.[8] Where they did not provide this, I used the official ESRB website to retrieve the ratings.

I collected cross-sectional data on 299 individual games, and Table 1 summarizes the data. In order to be included in the data set, a game was required to have sales data available for the United States and Japan, as well as an American or Japanese developer. I excluded games produced in all other countries to prevent contamination of the two-country, one-product approach suggested in the literature (Balbanis and Diamantopoulos, 2004). In the case where the programmers were of one origin and the publisher of the title of another, I used the COO of the programmers/development team, which determines the greatest portion of the creative direction of the title. Both are listed on the box, but the developer's work is what is present in the cover

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[6] GameStats. *IGN Entertainment.* Website: http://www.gamestats.com/

[7] For an example of a review, please see Schneider (1998).

[8] The Entertainment Software Rating Board assigns all games released in the United States with a rating for age-appropriateness, described later in the paper. Website: http://www.esrb.org/index-js.jsp

art, the screenshots on the back, and any other descriptive content on the package. The data contain no severe outliers and the distributions within categories seem reasonable. The only irregularities are that several wrestling games in this dataset specifically target American audiences but were produced by a Japanese development team. The games sold poorly in Japan but well in the US, so this could introduce a form of distortion. There are only 13 of these titles in total, so the overall impact should be small, and they are dropped later for robustness.

Data for sales figures in the US and in Japan are in millions of game copies sold (units). The units sold in the US over the sample period ranged from 12.97 million units (*Super Mario World*; Super Nintendo Entertainment System [SNES]) to .03 million units (*Yakuza 2*; Playstation 2 [PS2]). In Japan, the highest selling title was *Sonic the Hedgehog* (Genesis; 4.54 million), with several titles sharing the lowest sales figure of .01 million units as reported by VG Chartz.[9] The mean sales figure for a game in the US is 1.58 in millions of units; in Japan, it is 0.63 million. The standard deviation for sales is 1.51 for the US and 0.81 for Japan.

Genre contains multiple categorical dummy values. They are Action, Adventure, Fighter, First Person Shooter (FPS), Platform, Puzzle, Racer, Shooter, Simulation (Sim), Sports, Strategy, and Other. Action comprises the largest section of the industry, with 17% of all video games falling into this category; for further information, Table 1 contains a complete breakdown of the compilation of the dataset by genre. Action is the omitted dummy, which accounts for the majority of games released in terms of genre.

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[9] These include *Spyro 2: Ripto's Rage* (Playstation), several NFL titles, several *Tony Hawk* titles, *Star Wars: Jedi Power Battles* (Playstation), and *Guitar Hero III* (PS2).

System contains categorical dummies for the SNES, Sega Genesis, Sony Playstation, Nintendo 64 (N64), the PS2, Nintendo Gamecube, and the Microsoft Xbox. The breakdown of title distribution is in Table 1, with the PS2 leading with 39.8% of games released.

Quality is an averaged review score out of 10, with 10 being the best possible score. *Famitsu* scores are out of 40 and are adjusted to the 10 scale. The highest quality rating belongs to *The Legend of Zelda: Ocarina of Time* (N64), which received a 9.8 average score in the US and a 10 in Japan. The lowest rated game in the US is *Reel Fishing* (PS) with a 5.4, while in Japan it is *Madden NFL 06* (PS2) with a 6.25. Complete information is in Table 1. Scores from Japanese publications are available for only 45% of the included titles (126 observations). There is no observable pattern among games that have scores available and those that do not, though there are fewer scores available for older games. The correlation between American and Japanese scores and the proportion of availability of scores to game distribution within the dataset are such that it should not affect the results significantly.

Target age group uses the ESRB's rating scale to determine a specific title's intended age bracket. The three ratings within the dataset are E for Everyone (ages 6 and up), T for Teen (13 and up) and M for Mature (17 and up) (ESRB, 2008). There are 157 games rated with an E (52.51%), 98 games with a T (32.78%) and 44 games with an M (14.72%) (Table 1). The values correlate with the ratings given to games in Japan by the Japanese organization for game rating, the Computer Entertainment Rating Organization (CERO), but since CERO began operation in 2002, its ratings are unavailable for a majority of the games within this dataset.[10] Due to the lack of available review scores from CERO, I use the ESRB ratings for all games in the dataset.

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[10] Website: http://www.cero.gr.jp/

Section 5. Analysis

Using the previously specified variables, I regress the following equations:

$$\ln(JapaneseSales) = \alpha + \beta_1(COO) + \beta_2(System) + \beta_3(Genre) + \beta_4(ESRB) + \beta_5 \ln(Quality) + \varepsilon$$

$$\ln(AmericanSales) = \alpha + \beta_1(COO) + \beta_2(System) + \beta_3(Genre) + \beta_4(ESRB) + \beta_5 \ln(Quality) + \varepsilon$$

The results, listed in Table 2, show a strong and significant COO bias in the expected direction for games produced abroad; this is significant at the 1% level.[11] The negative and significant coefficient on the COO variable shows a bias against foreign games in the domestic market. In the American market, a Japanese COO value is negative and significant, which behaves as theory would expect; that is, consumers make value judgments based off of COO in favor of domestic products. This results in 644,000 to 1.205 million fewer units in sales for Japanese games in the American market and 1.735 million to 2.244 million fewer units in sales for American games in the Japanese market because of a game's COO.

The dummy for genre behaves as expected, with the effect of some genres being significant and some insignificant in both positive and negative directions. However, Sports titles are negative and highly significant in all Japanese sales data regressions. As these titles focus largely on the American market (specifically with reference to teams, players, etc.), I exclude them for the sake of robustness in later regressions. The dummy for system is significant in the regressions for Japanese sales data, but loses its significance with the American data. This is likely due to the power of the Playstation brand in Japan, which dominated the

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[11] A VIF test finds no multicollinearity in the variables outside of the two review variables, which is expected. A White test for heteroskedasticity shows that there is none present within the data. The large number of dummy variables consumes 24 degrees of freedom from the 299 observations present in the regression. This level of consumption should not affect the end regression results. Additionally, regressions use review scores from both nations separately, including an aggregation of the two review scores.

home console market during the two generations in the dataset for which it existed, as well as Nintendo's hold during the 16-bit generation. The X-Box remained an unpopular system in Japan, while it was relatively successful in the American market. This could lead to the significance of the system dummy in the Japanese market, as consumers flocked to the Playstation 2 while American game players were more diversified.

Target age group is significant for Japanese sales data, and the effect of the "Mature" and "Teen" ratings is negative compared to the "Everyone" rating (the omitted dummy). The sign is negative for all in five of the six regressions for both countries, except in regression four, where Teen is barely positive and insignificant. This is likely due to the differences in preferences for more mature content, where American consumers are more spread out among the different ratings while Japanese consumers are concentrated in E-rated games. Mature and Teen rated games also have a smaller target audience due to their content, and so it is understandable that they experience a negative coefficient, as the number of E-rated games accounts for more than 50% of the included games.

Finally, quality is highly significant and positive in five of the six regressions. This is expected, as the quality of a game will affect not only its ability to sell initially, but as it becomes subject to network and word-of-mouth effects, a poor-quality game will sell fewer copies while higher quality will be rewarded, particularly over time (Chevalier and Mayzlin, 2003). Notably, the *Famitsu* review scores are insignificant yet still positive for the American sales data, suggesting the strong difference in preferences between the two countries, though American review scores are still significant in Japan. This is likely due to the greater number of averaged review scores available from American sources and that, based on regression results and the

Oaxaca-Binder composition below, American preferences for games seem to be more varied, both within and beyond measures of quality.

Using domestic or foreign measures of quality does not alter the regression results significantly; rather, bias remains while shifts in significance of the preference measurements for ESRB rating and genre occur. There are some changes of sign in the genre dummies that reflect the shift in preferences generated by the foreign and averaged review scores, but the significances remain the same, except for the fifth regression, where the *Famitsu* scores are insignificant (it becomes significant and positive in the robustness checks). Using the domestic review scores reduces the presence and effect of COO bias, but it is still significant and negative for foreign games, further confirming its presence.

It is also important to understand the level to which bias is affecting video game sales. In order to determine the amount of bias present in the coefficient for COO, I use a two-fold Oaxaca-Binder Decomposition (Jann, 2008) in order to break down the effect of domestic country bias on sales. For a detailed explanation of the decomposition method, please see Appendix 1.

The results of the decomposition are in Table 3, where the six regressions correspond to the regressions in Table 2. The predictions result in a difference of 2.01 to 2.51 million units in Japan between domestic and foreign game sales respectively, and 0.61 to 0.65 in the US.

Thirty-one percent of the difference in sales of Japanese and American games in the Japanese market can be explained by difference in the average characteristics of Japanese and American games. In other words almost one-third of the sales difference occurs because the average characteristics of American games are less appealing than those of Japanese games to consumers. This explained portion is only significant when using *Famitsu* review scores, and the amount explained falls dramatically when using the averaged or American review scores, though it remains positive in all three cases. In the American market, the explained portion is negative, which means that the average characteristics of Japanese games are more appealing to consumers than the average characteristics of American games. That is, Japanese games do a better job of appealing to consumers of video games in the United States than American games do when measuring with the averaged or *Famitsu* quality ratings. This is also only significant when using the averaged or *Famitsu* scores, while using American review scores reduces the explained portion to nearly zero, though the result retains the negative sign. The results using the domestic review scores for the Japanese and American markets suggest that these quality measures strongly capture domestic preferences, and that when the review scores used are averaged or are from the other country, the difference in preferences between the domestic and foreign review scores results in a higher level of measured bias.

The unexplained portion is significant and positive in all cases. This suggests that millions of sales are unaccounted for by differences in characteristics. This means that the benefit of development by a Japanese team will result in a boost equal to 1.74 to 2.24 million units over American games in Japan, with a likewise boost of about 0.64 to 1.21 million units for American games in the United States, depending on the quality measure used, regardless of the game's characteristics. Additionally, in the American market the interaction between the negative explained and positive unexplained portions suggests that, though Japanese games are more appealing than American games, American consumers are buying more American games despite the average characteristics of Japanese games being "better."

The sports game genre is a potential contaminant of these results, as the domestic preferences present in the choice of teams and types of sports (e.g., American football games) could drastically affect sales differences between countries. To account for this, Table 4 contains regression results without sports games. Added to the robustness is a dummy variable for a superstar effect (Elberse et al., 2006). This variable aims to capture the effect on sales of being a famous, long-running franchise or having ties to potential spillover effects, meaning that this dummy captures the effect of movie affiliation (e.g., *The Incredibles*) or being a powerful franchise (e.g., any *Mario* game).

The results of these regressions in Table 4 are largely the same as those in Table 2. COO bias remains significant in all cases at the 1% level with similar coefficients. There are shifts of significance in the genre, but the pattern is similar to the previous regressions. There is also a significant and negative effect for "Teen" rated games in the regressions for American data, while the age variable loses its significance for the Japanese data. This is likely due to the fact that the dropped wrestling games were mostly Teen-rated games that sold well in the US but poorly in Japan, and those games made up a significant portion of the included Teen games in the dataset. The signs for the other age values remain the same. System remains significant for Japan only, unchanged from Table 2. The superstar variable is insignificant but positive for sales in Japan, and highly significant and positive for the American sales data. The insignificance in the Japanese sales data may be due to the absence in the dataset of many popular franchises released only in Japan, particularly in the earlier console generations. Additionally, the only movie tie-in games released in both countries were those based on American films like *The Matrix* and *Spider-Man*, which would help explain why it is only significant in the US. The results still confirm the presence of COO bias within the market for both countries, even when accounting for the effects of domestic market-centric games.

The Oaxaca-Binder Decomposition results in Table 5 show the presence of COO bias once again. Foreign games retain their lower sales and significance for unexplained differences with similar coefficients. As in Table 3, the explained difference for sales in Japan becomes significant only when using the *Famitsu* review data. The signs in the Japanese sales data remain the same. In the American sales data, the fourth regression changes signs but remains economically insignificant and the sixth regression loses its significance. This is likely due to the robustness changes, but the results suggest the same thing. Notably, without Sports titles and accounting for superstar effects, the difference in sales is lower, with a 0.10 to 0.20 million unit fall in the difference in the US and a 0.10 million unit decrease in sales difference in the Japanese market. The difference remains largely unexplained by the variables, suggesting either a significant number of preferences uncaptured by genre, system, quality, target age group, or superstar effects, or a large amount of sales difference due to COO bias. Based on previous research and extensive controls for preferences, it is likely that COO bias is a significant contributor to the difference in sales.

Conclusion

This paper tests for and finds the presence of COO bias in the American and Japanese video game markets. The results reveal a highly significant bias against foreign-made games in both countries, even when accounting for other common and important aspects of purchasing decisions. Using an Oaxaca-Binder Decomposition to measure the amount of bias present yields a result suggesting that COO bias significantly affects sales, particularly in the Japanese market, where the amount unexplained by the control variables is significantly higher.

This helps confirm the predictions of COO theory and how it affects the purchasing patterns of domestic residents. By breaking down the key signals available to a consumer and measuring the effect of being produced in another country, this paper helps to show that COO acts as a strong influence on purchasing decisions, particularly when dealing with complex goods such as video games. This paper does not examine the causes of COO bias; instead, it determines their existence and attempts to quantify its effect within a specific industry between two countries. However, it is likely that COO's affect on video games is fundamental, endowing games with a 'foreignness' that repels consumers. This 'foreignness' is an unwarranted distaste that affects people's decisions regardless of present characteristics, and must be understood before addressing it. Looking ahead, determination of the causes of this bias is key to understanding and confronting these market biases is of great significance to this expanding, global market.

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Table 1: Summary Statistics

Table 1a: Numerical Variables

Variable	Observations	Mean	Standard Deviation	Min	Max
American Sales	299	1.60	1.52	0.03	12.97
Japanese Sales	299	0.63	0.82	0.01	4.54
American Review Score	299	8.34	0.82	5.40	9.80
Adjusted *Famitsu* Score	126	8.53	0.89	6.25	10.0

Table 1b: Categorical Variables

Genre	Frequency	Percent	Cumulative
Action	52	17.39	17.39
Adventure	18	6.02	23.41
FPS	7	2.34	25.75
Fighter	32	10.7	36.45
Other	26	8.7	45.15
Platform	43	14.38	59.53
Puzzle	5	1.67	61.2
RPG	28	9.36	70.57
Racer	23	7.69	78.26
Shooter	13	4.35	82.61
Sim	7	2.34	84.95
Sports	45	15.05	100
Total	299	100	

System	Frequency	Percent	Cumulative
GameCube	38	12.71	12.71
Genesis	7	2.34	15.05
Nintendo 64	40	13.38	28.43
Playstation	57	19.06	47.49
Playstation 2	119	39.8	87.29
SNES	31	10.37	97.66
X-Box	7	2.34	100
Total	299	100	

ESRB	Frequency	Percent	Cumulative
E	157	52.51	52.51
M	44	14.72	67.22
T	98	32.78	100
Total	299	100	

Table 2: Regression Results

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	J. Sales	J. Sales	J. Sales	A. Sales	A. Sales	A. Sales
American	**-1.735**	**-1.884**	**-2.244**			
	(7.64)**	**(12.42)****	**(9.78)****			
Japanese				**-0.644**	**-1.205**	**-1.059**
				(5.44)**	**(4.83)****	**(4.88)****
Adventure	-0.511	0.192	-0.369	0.127	-0.134	-0.276
	(1.47)	(0.60)	(0.98)	(0.51)	(0.35)	(0.78)
FPS	0.797	0.486	0.745	0.646	1.197	1.186
	(1.09)	(1.02)	(0.94)	(1.74)	(1.49)	(1.58)
Fighter	-0.442	**0.659**	-0.441	**0.598**	0.679	0.511
	(1.15)	**(2.03)***	(1.05)	**(2.36)***	(1.60)	(1.29)
Other	-0.245	-0.014	-0.669	0.219	-0.016	-0.016
	(0.54)	(0.04)	(1.38)	(0.89)	(0.03)	(0.04)
Platform	-0.163	0.320	-0.402	0.295	-0.065	-0.040
	(0.40)	(1.13)	(0.93)	(1.33)	(0.15)	(0.10)
Puzzle	-0.820	-0.136	**-1.521**	-0.525	-0.839	-1.256
	(1.17)	(0.25)	**(2.00)***	(1.23)	(1.09)	(1.75)
RPG	0.141	**0.653**	0.040	-0.280	0.104	-0.032
	(0.43)	**(2.20)***	(0.11)	(1.21)	(0.29)	(0.09)
Racer	-0.395	0.023	-0.613	**0.609**	0.806	0.542
	(0.79)	(0.07)	(1.13)	**(2.39)***	(1.47)	(1.05)
Shooter	0.230	-0.073	-0.182	0.174	0.133	0.106
	(0.61)	(0.21)	(0.45)	(0.64)	(0.32)	(0.28)
Sim	-0.092	0.313	-0.172	-0.153	-0.148	-0.273
	(0.13)	(0.66)	(0.23)	(0.42)	(0.20)	(0.39)
Sports	**-0.923**	**-1.257**	**-1.606**	-0.200	-0.496	-0.714
	(2.24)*	**(4.72)****	**(3.72)****	(0.96)	(1.10)	(1.75)
Mature	**-0.829**	-0.439	**-0.957**	0.054	-0.237	-0.371
	(2.23)*	(1.55)	**(2.37)***	(0.24)	(0.58)	(0.97)
Teen	-0.426	**-0.757**	**-0.710**	0.004	-0.426	-0.484
	(1.49)	**(4.12)****	**(2.33)***	(0.03)	(1.36)	(1.68)
Famitsu Rating	**6.296**				1.680	
	(6.12)**				(1.49)	
American Rating		**3.482**		**2.465**		
		(5.32)**		**(4.83)****		
Avg. Rating			**3.341**			**3.314**
			(4.10)**			**(4.30)****
System P-Value	**0.020**	**0.000**	**0.000**	0.351	0.344	0.600
Constant	-13.539	-7.761	-6.697	-4.852	-2.495	-5.894
	(5.91)**	(5.65)**	(3.83)**	(4.57)**	(1.03)	(3.54)**
Observations	126	299	126	299	126	126
R-squared	0.76	0.62	0.72	0.29	0.34	0.43

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%; significant terms in bold

Table 3: Oaxaca-Binder Decomposition Results

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	J. Sales	J. Sales	J. Sales	A. Sales	A. Sales	A. Sales
Prediction 1	**-0.426**	**-0.687**	**-0.426**	**0.456**	**0.538**	**0.538**
	(3.62)**	**(7.16)****	**(3.62)****	**(7.29)****	**(4.57)****	**(4.55)****
Prediction 2	**-2.933**	**-2.765**	**-2.933**	**-0.152**	-0.111	-0.111
	(16.66)**	**(21.23)****	**(16.65)****	**(1.99)***	(0.93)	(0.93)
Difference	**2.507**	**2.078**	**2.507**	**0.608**	**0.649**	**0.649**
	(11.84)**	**(12.84)****	**(11.84)****	**(6.14)****	**(3.87)****	**(3.86)****
Explained	**0.772**	0.194	0.263	-0.035	**-0.557**	**-0.410**
	(4.02)**	(1.53)	(1.55)	(0.48)	**(2.97)****	**(2.43)***
	30.7%	9.3%	10.5%	5.2%	**-85.7%**	**-63.2%**
Unexplained	**1.735**	**1.884**	**2.244**	**0.644**	**1.205**	**1.059**
	(7.37)**	**(12.90)****	**(9.79)****	**(5.59)****	**(4.82)****	**(5.02)****
	69.2%	**90.7%**	**89.5%**	**94.8%**	**185.7%**	**163.2%**
Observations	126	299	126	299	126	126

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%; significant terms in bold

Table 4: Robustness Regression Results

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	J. Sales	J. Sales	J. Sales	A. Sales	A. Sales	A. Sales
American	**-1.724**	**-1.796**	**-2.149**			
	(6.41)**	**(10.59)****	**(8.27)****			
Japanese				**-0.487**	**-1.074**	**-0.676**
				(4.00)**	**(4.42)****	**(3.25)****
Adventure	-0.391	0.129	-0.269	0.035	-0.349	-0.347
	(1.10)	(0.41)	(0.74)	(0.15)	(1.09)	(1.20)
FPS	0.718	0.113	0.670	**0.826**	1.171	1.122
	(0.98)	(0.24)	(0.89)	**(2.47)***	(1.77)	(1.85)
Fighter	-0.321	0.492	-0.346	**0.633**	**0.733**	0.624
	(0.81)	(1.54)	(0.85)	**(2.76)****	**(2.06)***	(1.90)
Other	-0.185	0.322	-0.468	0.043	-0.079	-0.299
	(0.40)	(1.03)	(1.00)	(0.19)	(0.19)	(0.80)
Platform	-0.081	**0.586**	-0.219	0.103	-0.023	-0.117
	(0.20)	**(2.10)***	(0.52)	(0.51)	(0.06)	(0.35)
Puzzle	-0.512	0.324	-1.030	-0.675	-0.721	**-1.369**
	(0.71)	(0.61)	(1.38)	(1.76)	(1.11)	**(2.29)***
RPG	0.235	**0.638**	0.155	-0.400	-0.061	-0.201
	(0.71)	**(2.19)***	(0.45)	(1.92)	(0.21)	(0.74)
Racer	-0.090	0.278	-0.191	**0.476**	0.539	0.286
	(0.17)	(0.85)	(0.35)	**(2.04)***	(1.14)	(0.66)
Shooter	0.125	-0.133	-0.223	0.265	0.479	0.203
	(0.33)	(0.39)	(0.58)	(1.10)	(1.39)	(0.66)
Sim	0.110	0.429	0.060	-0.049	0.197	0.092
	(0.16)	(0.93)	(0.08)	(0.15)	(0.31)	(0.16)
Mature	-0.564	0.086	-0.579	-0.257	-0.502	-0.613
	(1.38)	(0.29)	(1.37)	(1.22)	(1.36)	(1.81)
Teen	-0.264	-0.088	-0.384	**-0.480**	**-0.862**	**-1.017**
	(0.83)	(0.39)	(1.17)	**(3.00)****	**(3.00)****	**(3.86)****
Superstar	0.146	0.067	0.128	**0.426**	**0.692**	**0.702**
	(0.62)	(0.41)	(0.52)	**(3.64)****	**(3.23)****	**(3.58)****
Famitsu Rating	**5.344**				**5.022**	
	(4.50)**				**(4.68)****	
American Rating		**3.993**		**3.341**		
		(5.51)**		**(6.43)****		
Avg. Rating			**3.013**			**4.340**
			(3.66)**			**(6.58)****
System P-Value	**0.019***	**0.000****	**0.000****	0.114	0.372	0.300
Constant	-11.775	-9.323	-6.437	-6.718	-9.783	-8.309
	(4.51)**	(6.05)**	(3.65)**	(6.13)**	(4.28)**	(5.83)**
Observations	111	243	111	243	111	111
R-squared	0.74	0.59	0.72	0.37	0.49	0.57

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%; significant terms in bold

<u>Table 5: Robustness Oaxaca Results</u>

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	J. Sales	J. Sales	J. Sales	A. Sales	A. Sales	A. Sales
Prediction 1	**-0.320**	**-0.476**	**-0.320**	**0.472**	**0.494**	**0.494**
	(2.87)**	**(5.32)****	**(2.87)****	**(6.97)****	**(3.89)****	**(3.88)****
Prediction 2	**-2.755**	**-2.462**	**-2.755**	-0.037	0.028	0.028
	(15.49)**	**(17.14)****	**(15.47)****	(0.47)	(0.24)	(0.24)
Difference	**2.434**	**1.986**	**2.434**	**0.509**	**0.466**	**0.466**
	(11.60)**	**(11.74)****	**(11.59)****	**(4.90)****	**(2.71)****	**(2.70)****
Explained	**0.711**	0.190	0.285	0.022	**-0.608**	-0.210
	(3.52)**	(1.43)	(1.60)	(0.25)	**(3.19)****	(1.10)
	29.2%	9.6%	11.7%	4.3%	**-130.4%**	**-45.1%**
Unexplained	**1.724**	**1.796**	**2.149**	**0.487**	**1.074**	**0.676**
	(6.27)**	**(10.68)****	**(8.54)****	**(4.21)****	**(5.08)****	**(3.52)****
	70.8%	**90.4%**	**88.3%**	**95.7%**	**230.4%**	**145.1%**
Observations	111	243	111	243	111	111

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%; significant terms in bold

Appendix 1

Explanation of the Oaxaca-Binder Decomposition:

I use the Oaxaca-Binder Decomposition to decompose the difference in sales between Japanese and American games in the Japanese market into two components. The first component represents the portion of the difference that can be explained by differences in genre, system, target age group, and review scores, while the second component represents the part of the difference that cannot be explained by these characteristics. I attribute the unexplained part to discrimination on the part of Japanese buyers against American games. I then rerun the decomposition to determine the portion of the sales difference between American and Japanese games in the United States that can be attributed to American bias against Japanese games.

Consider the difference in sales of American and Japanese games in the Japanese market:

Sales of video games in Japan (Sales) are regressed as a function of genre (G), system (S), target age group (TAG) and review score as a measure of quality (Q).

The equations for sales in each country become:

$$Sales_J = \alpha_J + \beta_{1,J} G_J + \beta_{2,J} S_J + \beta_{3,J} TAG_J + \beta_{4,J} Q_J + \varepsilon \quad (1)$$

$$Sales_{US} = \alpha_{US} + \beta_{1,US} G_{US} + \beta_{2,US} S_{US} + \beta_{3,US} TAG_{US} + \beta_{4,US} Q_{US} + \varepsilon \quad (2)$$

where *J* represents games developed in Japan and *US* represents games developed in the United States. Regression analysis generates the estimates of the coefficients β_1, β_2, β_3, β_4 for Japanese and American games separately.

The estimated regression then uses the mean (designated with a hat) of each explanatory variable to find the average number of sales of Japanese and American games in the Japanese market:

$$\hat{S}ales_J = \alpha_J + \beta_{1,J} \hat{G}_J + \beta_{2,J} \hat{S}_J + \beta_{3,J} \hat{T}AG_J + \beta_{4,J} \hat{Q}_J \quad (3)$$

$$\hat{S}ales_{US} = \alpha_{US} + \beta_{1,US} \hat{G}_{US} + \beta_{2,US} \hat{S}_{US} + \beta_{3,US} \hat{T}AG_{US} + \beta_{4,US} \hat{Q}_{US} \quad (4)$$

The average gap in average sales of American games and Japanese games in the Japanese market then is:

$$\hat{S}ales_J - \hat{S}ales_{US} = \alpha_J + \beta_{1,J} \hat{G}_J + \beta_{2,J} \hat{S}_J + \beta_{3,J} \hat{T}AG_J + \beta_{4,J} \hat{Q}_J - (\alpha_{US} + \beta_{1,US} \hat{G}_{US} + \beta_{2,US} \hat{S}_{US} + \beta_{3,US} \hat{T}AG_{US} + \beta_{4,US} \hat{Q}_{US}) \quad (5)$$

Add and subtract the averages for: $\beta_{1,J} G_{US}$, $\beta_{2,J} S_{US}$, $\beta_{3,J} TAG_{US}$, $\beta_{4,J} Q_{US}$

$$\hat{S}ales_J - \hat{S}ales_{US} = \beta_{1,J}(\hat{G}_J - \hat{G}_{US}) + \beta_{2,J}(\hat{S}_J - \hat{S}_{US}) + \beta_{3,J}(\hat{T}AG_J - \hat{T}AG_{US}) + \beta_{4,J}(\hat{Q}_J - \hat{Q}_{US}) + (\alpha_J - \alpha_{US}) + (\beta_{1,J} - \beta_{1,US})\hat{G}_{US} + (\beta_{2,J} - \beta_{2,US})\hat{S}_{US} + (\beta_{3,J} - \beta_{3,US})\hat{T}AG_{US} + (\beta_{4,J} - \beta_{4,US})\hat{Q}_{US} \quad (6)$$

The first four terms represent the explained portion of the gap in sales, i.e., the gap resulting from differences in the average characteristics between Japanese and American video games.

- If Japanese and American games had the exact same makeup of genres, system compatibility, target age groups and quality, then the first four terms would equal 0.
- If Japanese developers start selling more of what Japanese consumers want (their games better match consumer preferences), then they will sell more games in Japan than American developers, who may not match those preferences as well as the Japanese developers. This explains a positive gap when dealing with game sales in Japan for games made by Japanese developers.

The last five terms are the unexplained (discriminatory) portion of the gap.

- I attribute this to differences based on country-of-origin (COO). These terms indicate how returns to the characteristics of Japanese games differ from the returns of those same characteristics in American games.
- If β_1, β_2, β_3, and β_4 are the same for Japanese and American games, then the unexplained portion is 0, which means that the gap is entirely due to differences in characteristics.

Table 3 presents the results of the decomposition, and Table 5 contains the decomposition results with robustness checks. I calculated the decomposition for games sold in the US market in a similar manner.