

Cultural Preferences in International Trade: Evidence from the Globalization of Korean Pop Culture*

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Abstract

Korean pop culture (soap operas and K-pop music) has grown immensely popular across the globe over the past 15 years. This paper analyzes its impacts on international trade. We compile cross-country panel data on South Korea's TV show exports to 136 countries for the period 2001–2014. These data, when combined with Korea's exports of goods (HS 4-digit level), exhibit large variations across years, countries, and products. We demonstrate that more exposure to Korean culture increases foreign consumers' demand for Korean goods, and the effect differs across types of products. First, given the fact that women spend more time consuming Korean soap operas and music, we show that higher Korean TV show exports significantly increase female visitors to Korea and its exports of women's clothing and cosmetics, while the effects are smaller on male visitors and men's clothing. This provides strong evidence for the demand-side preference mechanism, because supply-side factors can hardly generate such gender bias within the same product category. Furthermore, we find that Korean TV show exports have significantly positive effects on consumer goods, but no effects on capital or intermediate goods. Together, these findings highlight the role of cultural flows on consumer preferences in international trade.

Key Words: Korean Wave; Trade; FDI; Gravity Equation; Cultural Preferences

JEL Classification: F14; F21; Z1

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1 Introduction

“The booming South Korean presence on television and in the movies has spurred Asians to buy up South Korean goods and to travel to South Korea, traditionally not a popular tourist destination. The images that Asians traditionally have associated with the country — violent student marches, the demilitarized zone, division — have given way to trendy entertainers...”

— *The New York Times*, 2005 (by Norimitsu Onishi)

Are cultural preferences important in international trade flows? It is difficult to systematically identify such effects because most cultural factors — language, ethnicity, and religion, for example — evolved over a long time and are strongly correlated with geographical factors. This paper overcomes this difficulty by using the phenomenon of the relatively fast global spread of Korean pop culture and demonstrates that this leads to increased exports of South Korea by changing foreign consumers’ preferences for the country’s products. Because the cultural flows vary substantially over time and across countries, and because their effects on consumer preferences are likely to differ significantly across products, these rich variations allow us to identify the cultural effects on trade. To the best of our knowledge, this is the first paper in the trade literature demonstrating causality where cultural shocks to the demand side affect international trade.

Over the past 15 years, Korean popular culture, especially soap operas (television dramas) and K-pop music, has become immensely popular across the globe. This phenomenon is called the “Korean Wave” (or “Han-Ryu” in Chinese), a term that was coined by the Chinese media around 1998 and is now commonly used worldwide. For example, in 2011, the French newspapers *Le Monde* and *Le Figaro* carried stories under the headlines “Korean Wave Reaches Europe” and “Korean Wave Hits Zénith.”

Although K-pop is better known in the western world, it is Korean soap operas that initially led the wave in Asia and in many countries in the Middle East and South America. The Korean wave first began in China in 1997 with the drama series *What is Love All About?* It recorded a 15% audience share, meaning that over 150 million Chinese watched it.¹ Meanwhile, the wave arrived in Japan in 2003, with another Korean drama series, *Winter Sonata*, which recorded a sensational audience rating of 22.5%. Koreans were pleasantly surprised by this, because previously in Japan, Korean cultural contents had hardly received any attention despite the geographical proximity. The popularity has since grown dramatically in both countries, and nowadays Korean culture naturally pervades everyday life in these countries.²

Interestingly, Korean culture has become even more popular in more distant Asian/Central Asian countries (Vietnam, Thailand, Singapore, Taiwan, Malaysia, Indonesia, Kazakhstan, Mon-

¹The audience ratings of Korean dramas are reported by numerous news articles and various reports by the Ministry of Foreign Affairs and Korea Foundation for International Culture Exchange.

²For example, another Korean drama series, *Descendants of the Sun*, has become extremely popular in China, attaining viewership of 2.6 billion within two months of its debut in February 2016 (the 2.6 billion figure is the sum of 16 episodes’ viewership, reported by the Chinese online video platform, *Iqiyi*.) Similarly, it is no longer surprising to see K-pop songs ranked at the top of many pop music charts in Japan.

golia, Philippines, Uzbekistan, Brunei, Myanmar, Cambodia, Kyrgyzstan, and Tajikistan). For example, in Kazakhstan, Tajikistan, and Mongolia, the audience ratings exceeded 70% for *Jumong* (2007), *Jewel in the Palace* (2007), and *Wife's Temptation* (2009), respectively.

The Korean wave has surpassed physical distance, language barriers, and differences in ethnicity and religion, and reached the Americas as well as the Middle East and Europe (Peru, Iran, Hungary, Panama, Ecuador, Cuba, Paraguay, Romania, El Salvador, Bolivia, Chile, Costa Rica, Puerto Rico, UAE, Egypt, Turkey, etc.).³ In Ecuador, for example, the wave started in 2008 with a phenomenal 55% audience rating.⁴ In Cuba — with which South Korea has almost no economic and political ties — two drama series recorded more than 80% audience ratings in 2012–2013.⁵ As another example, in the Middle East, Islamic Republic of Iran Broadcasting (IRIB) reported that *Jewel in the Palace* was ranked as the most popular drama from March to April 2007, with a 57% audience rating and 97% satisfaction.⁶

To summarize the above observations, the Korean wave phenomenon has evolved in a relatively short time span, and features sharp and discontinuous shifts in exposure. The common pattern characterizing the rise of the Korean wave in these countries is that people started demanding increasing amounts of Korean TV shows and music, after a nationwide craze for one Korean soap opera. This suggests that the Korean wave may be mainly driven by foreign viewers' demand for fun and entertainment (DellaVigna and Ferrara, 2015). Meanwhile, the recent empirical studies about economic and social impacts of the media suggest that media portrayal of a role model leads to powerful imitative behavior, which can significantly affect a wide range of economic outcomes such as consumption behavior, women's status, divorce rate, fertility, baby naming patterns, education, and violent crime (Bursztyn and Cantoni, 2016; Jensen and Oster, 2009; Chong and Ferrara, 2009; Kearney and Levine, 2015; Olken, 2009; Ferrara et al., 2012).

In line with the literature and based on the extensive government survey report by KOFICE (2015b), we propose that the Korean wave affects foreign consumers' demand for Korean products through two main channels: the diffusion of preferences, and advertising based on the Korean wave. The Korean media contents can lead viewers to imitate the behavior of the stars and develop preferences for Korean products and services, which are depicted in use by the stars on the screen (diffusion of preferences). To show some evidence of the mechanism, Table 1 reports survey results of 6,500 foreign participants around the world who experienced Korean pop culture (KOFICE, 2015b). Interestingly, over 50% responded that watching Korean TV shows prompted them to want to eat Korean foods and visit Korea. Because one's demands for foreign foods and tourism are highly dependent on tastes and cultural preferences, the results provide evidence of the preference diffusion channel. Indeed, 45% replied that they became interested in purchasing 'Korean products in general' after experiencing Korean pop culture. Recognizing this, some Korean

³Among those countries, Peru has the largest and most devoted fans. It is reported that Channel 7, one of the most influential national channels in Peru, aired Korean dramas, instead of the news, in its prime time slot.

⁴*Stairway to Heaven* (2009).

⁵*Take Care of My Lady* (2012) and *My Wife is a Superwoman* (2013).

⁶Figure A.1 provides an illustration of the extent of popularity of Korean pop culture in countries. The construction of the popularity index is explained in the data appendix.

firms hire the associated celebrities to advertise their products (advertising taking advantage of the Korean wave).

This paper provides econometric analysis showing that more exposure to Korean pop culture (proxied by Korea’s TV show exports) changes foreign consumers’ preferences and leads them to buy more Korean goods, thus increasing South Korea’s exports in relevant industries. To do this, we compile the cross-country panel data of South Korea’s TV show exports to 136 countries for the period 2001–2014. This measure exhibits significant variations across countries and over time (see Figures 1 and 2 for the extent of growth in Korea’s TV program exports in the aggregate and across countries).

One of the challenges facing our estimation is that exports of Korean goods are subject to industry-specific time trends with causes unrelated to the Korean wave. For example, South Korea’s industrial specialization has moved upstream, with downstream tasks being relocated overseas in the past two decades. As a result, Korean exports of durable and semi-durable consumer goods have decreased, while exports of intermediate and capital goods have increased dramatically. To control for such industry-specific time trends, we pool over HS 4-digit industries and regress changes in goods exports on changes in TV show exports, using time-differenced frameworks with industry fixed effects.

To demonstrate the causality through the channel of consumer preferences, we employ the following identification strategies. First, we take into account the fact that women spend more time consuming Korean soap operas and K-pop music than men, and exploit the potential heterogeneous effects across genders.⁷ Accordingly, we identify industries where the gender of the consumer is known reasonably well — male versus female visitors to South Korea, men’s versus women’s clothing, and beauty products. We find that more TV show exports significantly increase female foreign visitors and Korea’s exports of women’s clothing, while the effects are much smaller for men. These results strongly support the demand-side preference mechanism, because supply-side factors can hardly generate such gender bias within industries producing the same goods. The most striking result appears in cosmetics. We find that doubling the TV show exports increases exports of cosmetic products by 41% (the total TV show exports roughly grew tenfold during 2001–2014).

Second, we test a natural hypothesis that such cultural influences have stronger effects on final consumer goods compared to intermediate or capital goods. We find that doubling the Korean TV show exports increases exports of consumer goods by 17%, while the effect is not significant for capital or intermediate goods. This is despite the fact that Korea’s nominal export value of non-consumer goods increased dramatically during the same time period (compared to consumer goods exports). Again, this strongly supports the preference mechanism: if it had been supply-side factors that affected both the Korean wave and Korea’s goods exports, stronger positive correlation would have been observed in non-consumer goods, where productivity increased greatly. When we restrict the set of consumer goods to those that are identified by Korean government reports as

⁷This gender biased phenomenon can be verified from the viewership data of online video platforms. For example, the largest Chinese online video website, *Iqiyi*, reports the gender composition of viewers of each video, indicating that more than 70% of viewers are female for most Korean dramas.

having been heavily influenced by the Korean wave (see Table 1, for example), we find that the effect on these *Korean wave goods* is higher at 26%. The fact that the result with the more specific indicator is stronger is consistent with the proposed preference mechanism and increases confidence in our interpretation of the results.

Last but not least, we perform two types of robustness checks to further strengthen the causality argument. First, we show that similar results hold when using a destination’s industry-specific Korean import shares (out of total imports from the world) as a dependent variable in the time-differenced framework mentioned above. For instance, we find that doubling Korea’s TV show exports to a country increases that country’s Korean import shares in women’s clothing and consumer goods by 21% and 10%, respectively, while the effects are insignificant for men’s and non-consumer goods. These findings address the concern that the benchmark results may be driven by countries where the demand for Korean TV shows as well as general demand for women’s clothing and consumer goods, all together, happened to increase substantially in the 2000s. Second, to verify that our results are not driven by some long-run common causal factor behind both the growth in TV show exports and the relative increase in women’s clothing or consumer goods exports, we conduct falsification tests by regressing *past* (in the 1990s) decadal changes in Korea’s exports on *future* (in the 2000s) decadal changes in TV show exports, using the frameworks mentioned above. In support of our proposed hypothesis, we find no spurious correlation.

Collectively, all our results are consistent with the proposed hypothesis that the Korean wave has induced significantly positive impacts on Korean goods exports through the demand-side mechanism, and rebut various endogeneity concerns such as omitted variable bias and reverse causality.

1.1 Related Literature and Contributions

The paper is closely related to the literature on the cultural aspects of international trade. For example, Guiso et al. (2009) show that lower bilateral trust reduces bilateral trade across countries. Similarly, Felbermayr and Toubal (2010), Disdier and Mayer (2007) and Disdier et al. (2010) construct alternative proxies for cultural proximity and document their positive effects on trade volumes. These papers, however, do not differentiate whether the mechanism works through the demand or supply side. Meanwhile, Melitz (2008), Melitz and Toubal (2014), and Egger and Lassmann (2015) focus on the supply side and study the role of common language in lowering communication costs. In essence, this literature does not contain systematic econometric studies that provide robust evidence of the demand-side mechanism. This is either because the studies depend on cultural variables (such as bilateral trust, language, and ethnicity) that have evolved over a long period of time — thus highly associated with history, proximity and historical trade routes — or because the source of the shocks and the mechanism are not clear.

In contrast, this paper uses a cultural shock which evolved in a relatively short time, where the sharp and discontinuous shifts in its exposure may be driven by foreign viewers’ demand for entertainment. Furthermore, the reach of the Korean wave surpasses any boundaries given by con-

ventional cultural proximity measures (such as language, religion, ethnicity, or physical distance).⁸ Using the unique properties of this cultural phenomenon, our paper demonstrates the demand-side mechanism: the heterogeneous effects of the Korean wave across products is consistent with plausible changes in foreign consumer preferences in response to the Korean wave.

This paper also relates to the growing literature studying the role of information in trade. To illustrate, Rauch and Trindade (2002) and Wagner et al. (2002) find that ethnic networks facilitate information flows and help match foreign buyers and sellers, which promotes international trade by lowering search costs. Cristea (2011) shows that high-quality information flow facilitated by in-person business meetings increases international trade. Allen (2014) demonstrates that information frictions in learning about conditions of distant markets are quantitatively important in regional agricultural trade in the Philippines. This literature, however, has predominantly focused on the supply side. Our work contributes to the literature by showing that cultural information flows on the demand side can also have significant impacts on international trade.

Lastly, some Korean researchers have attempted to study trade-creating effects of the Korean wave (e.g., Park and Choe, 2008, 2009; Choi, 2012). However, they have not been able to find robust evidence. This is mainly because these studies focused only on the aggregate bilateral exports. Indeed, our analysis presented below shows that one cannot identify robust effects by exploiting only country and time variations. The product variation (in addition to the country-time variation) is the key to the identification.

2 Korean Wave and Data Sources

In this section, we describe the measure of the Korean wave we use, and explain how we classify products depending on the hypothetically differing intensity of the trade-creating effects of the Korean wave.

2.1 South Korea’s TV Program Exports

We compiled the cross-country panel data on South Korea’s TV program exports for the period 2001–2014. These data were obtained from the “Annual Report on the Actual Condition of the Korean Broadcasting Industry”, prepared by the Korea Communications Commission, a government agency. The report has been published annually since 2001, with aggregate level data dating back to 1997. This publication reports South Korea’s TV program exports — both values and the number of episodes — to many countries for each genre.⁹ Seventy-four countries have imported Korean TV shows in any given year, implying that export values are zeros in all years for most of the other countries.¹⁰

⁸In fact, the Korean language is considered as a “language isolate,” sharing no genealogical relationship with other languages (see, e.g., Ethnologue).

⁹The genre composition is highly biased toward dramas, which accounted for 90% of the total TV show exports on average during 2010–2013, followed by reality shows at 5%.

¹⁰Some countries, mostly in South America, share major television networks. In this case, the Korean TV show exports are reported collectively for these countries as a group or region. We identify such countries, and drop their

Figure 1 illustrates the trend of aggregate Korean TV program exports. They grew strongly from US\$8 to US\$336 million during the period 1997–2014.¹¹ On the other hand, imports only slightly increased from US\$57 to US\$64 million. The right panel of Figure 2 shows the TV program exports to a subset of destinations for each year in 2001, 2004, and 2014. There were dramatic increases of Korean TV show exports to Japan, China, Singapore, Taiwan, Vietnam, Thailand, etc. In contrast, the TV show export values remained close to zero in countries such as India, Russia, France, and the UK. Overall, the TV show export data exhibit significant variations over time and across countries. Meanwhile, the left panel shows Korea’s TV program imports from the selected origin countries, where one can notice that the cross-country growth patterns are highly asymmetric between imports and exports. This implies that the fast increases in Korea’s TV show exports are not driven by some improved bilateral trade relationships in services. Instead, these patterns are likely to have been driven by viewers’ tastes and preferences for entertainment.

The global spread of Korean pop music is another key feature of the Korean wave. As shown in Figure 3, the export value of K-pop grew rapidly from US\$22 million to US\$381 million during 2005–2015, while music imports by South Korea increased only from US\$8 million to US\$14 million. Many countries’ enthusiasm for Korean culture started with its soap operas, before spilling over to K-pop music. Accordingly, Figure 3 shows that the exports of K-pop music started increasing dramatically only around 2008, several years after the success of Korean TV dramas overseas. Unfortunately, data on bilateral exports of K-pop music do not exist, so we cannot incorporate them systematically in our analysis. However, Korean TV shows likely have caused greater impacts on Korea’s merchandise exports than K-pop music, because viewers of Korean TV shows spend an extended period of time indirectly experiencing a large slice of Korean culture (including the fashions, foods, and electronic products used by the characters in the TV shows). The exposure to Korean culture is thus likely richer through the contents of soap operas than music clips, leading to potentially stronger affinity for Korean goods and services.

In addition to the Korean TV show export data described above, the publication also separately reports the aggregate sum of TV program exports to overseas Koreans all over the world for each year — these values are trivial at less than 0.5% of total TV show export values. We apportion the sum to each country according to its share of overseas Koreans, and add it to the primary TV show export data for each country and year. We use these data for all the subsequent analysis. The major advantage is that this significantly reduces the percentage of zeros from 83% to 13%, out of total observations of the sample in our analysis (a balanced data panel of 136 countries for the period 2001–2014). This is crucial because an important source of variation for identification comes from the comparison between the countries that are not interested in Korean TV shows —

associated observations from our analysis. This includes: e.g., Argentina, Brazil, Chile, Cuba, Ecuador, Panama, Paraguay and Peru.

¹¹The official export values likely under-represented the actual extent of culture exposure, because many people watch Korean TV shows using the internet. For example, the Korean drama series *My Love from Another Star (2014)* recorded over 6 billion viewers on the Chinese online video platform, *Iqiyi*, over the past three years. However, the South Korean owner sold the TV program for only about US\$3.5 million, while *Iqiyi* enjoyed over US\$100 million in profits within several months of the release (reported in numerous online news articles in South Korea).

thus rarely importing relevant Korean products — and other countries in the opposite situation.

2.2 Classification of Goods and Services

To examine the cultural effects on various industries in Korea, we employ data on bilateral imports from South Korea and imports from the world at the HS 4-digit product level (the Harmonized System Classification) taken from the UN Comtrade Database for the period 1991–2015.

Consumer versus non-consumer goods — One of our hypotheses is that the effects of the Korean wave are stronger on final consumer goods than intermediate and capital goods. To test this, we classify the HS 4-digit industries into consumer and non-consumer goods categories by using the concordance between HS and the Broad Economic Categories (BEC).¹² The consumer goods identified by the BEC are *Food and beverages - Primary/Processed - Mainly for household consumption; Passenger motor cars; Consumer goods not elsewhere specified - Durable, Semi-durable, and Non-durable*, etc. Table 2 shows the whole BEC list.

Women’s versus men’s — Given the well-documented fact that women have stronger affinity for Korean pop culture, we study the effects on the industries where the gender of the consumer is known. We use the trade data on clothing industries, HS 61 and 62, where the eight even-numbered HS 4-digit codes (6102–6108 and 6202–6208) represent women’s clothing, while odd-numbered codes are men’s, as listed in Panel C of Table 3. We also use cross-country panel data on female and male visitors to South Korea (available only for the period 2003–2015), provided by the Korea Tourism Organization.

Korean wave goods — A specific subset of consumer goods exist that are renowned for their boosted sales abroad largely due to the Korean wave. These goods are often called *Korean wave goods*. For what constitutes *Korean wave goods*, we refer to the information and survey reports provided by KOTRA and KOFICE (2015), and KOFICE (2015b). These *Korean wave goods* are typically foods/beverages, cosmetics, clothing/accessories, certain home appliances, electronic products, and cars. We identify these *Korean wave goods* by their HS 4-digit industries, which are listed in Panel A of Table 3.¹³

2.3 Other Data

In subsequent analysis, we will control for a list of trade cost proxies. This includes the physical distance between Korea and the destination country c ($\ln Dist_c$), the regional trade agreement indicator ($RTA_{c,t}$, which takes value 1 if destination country c has a preferential trade agreement with South Korea in year t and zero otherwise), the Korean embassy indicator ($Embassy_{c,t}$, which equals 1 if South Korea has an embassy in country c in year t and zero otherwise), the number of expatriate Koreans residing in the destination country ($\ln Koreans_{c,t}$), and the cross exchange rate

¹²Further details are provided in Section A.4 of the data appendix.

¹³For some products, such as food, we can only identify the broad HS 2-digit codes based on the information provided by the survey reports mentioned above. However, these often contain non-consumer goods as well. In this case, we use the above HS-BEC concordance again to include only consumer goods under these HS 2-digit sectors as *Korean wave goods*.

($\ln ExRate_{c,t}$, Korean Won / destination currency). Further details about these data, including the sources, are provided in Section A.3 of the data appendix.

3 Two Iconic Industries: Cosmetics and Tourism

This section documents the impact of the Korean wave on two iconic industries in Korea, cosmetics and tourism. It is a well-documented fact that women tend to have stronger preferences for Korean soap operas and K-pop music.¹⁴ In a consistent manner, Figure 4 shows that Korea’s exports of cosmetic products, predominantly purchased by women, grew substantially in destinations where Korean pop culture became very popular (e.g., China, Japan, Thailand, Vietnam, and Singapore). In contrast, the exports stayed relatively flat to the UK, Germany, and France, where Korean pop culture is not popular. This suggests that the Korean wave may have changed foreign consumer preferences over time and caused the increases of exports in the cosmetics and other relevant industries.

To provide econometric evidence, columns 1–3 of Table 4 report PPML estimation results where Korea’s cosmetic exports are regressed on one-year-lagged Korean TV show exports (in log), log of destination GDP, and the list of trade-cost proxies described in Section 2.3.¹⁵ The observation is a destination country and a year for all the variables.

The specification in column 1 includes year fixed effects (FEs) and exploits cross-country variation. The result indicates that doubling the Korean TV show exports leads to a 41% increase in cosmetic product exports.¹⁶ Next, it is crucial to show that the effect is also significant by exploiting within-country time variation, as time is another key dimension of variation of the Korean wave. Indeed, column 2 shows that the estimate with country fixed effects is highly significant but smaller at 24%. The effect increases to 41% (see column 3) again when the sample is restricted to the countries which imported a sufficiently large amount of Korean TV programs — more than 5,000 episodes during the period 2001–2014 — and hence exhibit large within-country time variation.¹⁷ Notably, the estimated coefficients are similar in magnitude in the year-FE and the country-FE regression (columns 1 and 3). This suggests that within-country response of cosmetics imports to the Korean wave is as significant as cross-country variations. These estimates are economically significant, considering that Korea’s total TV show exports grew more than tenfold during 2001–2014.

¹⁴For example, the largest online Chinese video website, *Iqiyi*, reports the gender composition of the viewers for each video, and more than 70% of the viewers are female for most Korean TV soap operas.

¹⁵The dependent variable is the sum of Korea’s cosmetic exports in the industries classified as HS 3304, 3305, 3307, and 3402 (see Table 3 for a detailed description). Missing trade values are replaced by zeros.

¹⁶The exchange rate variable is not included in the year-FE regression, because only the within-country variations in exchange rates are meaningful, while the exchange rates across countries are not comparable.

¹⁷The estimate is still very similar and significant at the 1% level, when the minimum cutoff is lowered to 3,000 episodes. There are 17 countries that imported more than 3,000 Korean TV show episodes: Australia, Cambodia, China, Hong Kong, Indonesia, Japan, Kazakhstan, Malaysia, Mongolia, Myanmar, Philippines, Romania, Singapore, Taiwan, Thailand, United States and Vietnam. Countries that import between 3,000 and 5,000 episodes are: Australia, Kazakhstan and Romania.

Tourism is another iconic industry that is known to be highly sensitive to the overseas popularity of Korean pop culture. As suggested by Onishi (2005) in the *New York Times*, Korea had been one of the least popular tourist destinations until around 2002, but the trend has since shifted due to the Korean wave: tourists to South Korea more than quadrupled during 2003–2016 as shown in Figure 5.¹⁸ The fact that women have stronger affinity for the Korean pop culture and that tourism is highly influenced by the Korean wave suggest the testable hypothesis: The Korean wave has attracted more female visitors than the male visitors. We examine this using a cross-country panel dataset of the annual number of female and male visitors to South Korea.

Columns 4–6 of Table 4 report PPML estimation results where the dependent variable is the proportion of female visitors.¹⁹ Consistent with our hypothesis, we find the cultural effect to be statistically and economically significant: The year-FE (country-FE) regression result implies that doubling the TV show exports increases the proportion of female visitors by 6% (4% in countries which imported more than 5,000 episodes). In addition, all the results in Table 4 are robust to dropping China from the sample, which allays the concern that the results may be driven by China’s economic growth in the 2000s.

To summarize, this section illustrated the impact of the Korean wave on two iconic industries: cosmetics and tourism. The fact that the estimated effects are positive and highly significant in both year-FE and country-FE regressions provides preliminary evidence for the hypothesis that the Korean wave changed foreign consumer preferences and induced their purchases of Korean products and services. In subsequent sections, to decisively demonstrate the causality through the demand-side mechanism, we adopt a systematic time-differenced framework with pooled observations across HS 4-digit industries and provide rigorous robustness checks.

4 Framework

We apply the model of Armington (1969), where products are differentiated by the country of origin, and allow foreign consumers’ exposure to Korean pop culture to affect their preference parameters for goods from Korea. Let countries and industries be indexed by c and i , respectively. We assume an upper-tier Cobb-Douglas preference over the industries, with expenditure share α_i ; thus $E_{ci} = \alpha_i \cdot Y_c$, where E_{ci} and Y_c are destination c ’s expenditure for industry i and nominal income, respectively. The lower-tier preference is assumed to be CES over goods originated from different countries within each industry. Each destination country c chooses imports q_{oci} in industry

¹⁸In comparison, according to the data provided by the World Bank, the number of tourists in the world (international tourism, number of arrivals) increased by only 80% during the same period. The slight decrease in tourists in 2015 was due to the serious outbreak of the epidemic disease MERS in South Korea. Note that tourists are the subset of foreign visitors who declared the purpose of their visits as tourism.

¹⁹We exclude countries whose per capita GDP in 2015 is less than US\$4,000, because visitors from these countries tend to consist of temporary workers who come to South Korea to work in construction sites or factories. The variable $Embassy_{c,t}$ is dropped from column 6, because the embassy status of Korea in the popular destinations did not change during 2003–2015.

i from origin o to maximize the lower-tier utility subject to E_{ci} :

$$\left(\sum_o (b_{oci})^{1/\sigma} (q_{oci})^{(\sigma-1)/\sigma} \right)^{\sigma/(\sigma-1)} \quad \text{subject to} \quad \sum_o p_{oci} q_{oci} = E_{ci} \quad (1)$$

where b_{oci} is the preference parameter for goods produced in o perceived by consumers in destination c , which can vary across industries i . The parameter $\sigma > 1$ is the elasticity of substitution; and $p_{oci} (\equiv p_{oi} \tau_{oci})$ is the destination price which equals the price in the origin country p_{oi} scaled up by the iceberg trade cost factor τ_{oci} . Solving the utility maximization problem of (1) gives us the export values from country o to destination country c in industry i :

$$Exp_{oci} = b_{oci} \left(\frac{p_{oi} \tau_{oci}}{P_{ci}} \right)^{(1-\sigma)} E_{ci} \quad (2)$$

where P_{ci} is the consumer price index of industry i in country c , given by $P_{ci} = \left[\sum_o b_{oci} (p_{oi} \tau_{oci})^{1-\sigma} \right]^{1/(1-\sigma)}$. We will omit the origin subscript below, since it is fixed at Korea in our analysis.

We hypothesize that the Korean wave affects the preference parameter $b_{ci,t}$, which is assumed to be a log-linear function of the 1-year-lagged Korean TV show exports to the destination c and a destination-industry specific shifter (\bar{b}_{ci}):

$$b_{ci,t} = \bar{b}_{ci} \cdot TVshowExp_{c,t-1}^{\theta_i} \cdot e^{\varepsilon_{ci,t}}, \quad (3)$$

where $\varepsilon_{ci,t}$ absorbs any other idiosyncratic shocks to the preference parameter over time not accounted for by the TV show exports. Note that we allow the elasticity θ_i (of the taste parameter with respect to the TV show exports) to vary across industries. Combining (2) and (3) yields the following gravity equation in log-linear form:

$$\ln Exp_{ci,t} = \theta_i \cdot \ln TVshowExp_{c,t-1} + \delta \ln GDP_{c,t} + X_{c,t} + u_{ci,t}, \quad (4)$$

where $X_{c,t}$ is a linear combination of trade cost proxies as described in Section 2.3. The error term $u_{ci,t}$ absorbs the effects of \bar{b}_{ci} , $p_{i,t}$, α_i , $\varepsilon_{ci,t}$ and any other unobserved variables. We will adopt various strategies as explained below to control for these unobservables.

One of the challenges facing our estimation is that exports of Korean goods exhibit different time trends across industries for reasons unrelated to the Korean wave. For example, as shown in Figure 6, Korea's exports of semi-durable goods — which consist mostly of clothing — decreased by more than 30% during 2000–2015, because many plants in the industry moved to nearby low-wage countries during the period.²⁰ Meanwhile, exports of intermediate and capital goods grew substantially, as South Korea's specialization moved to upstream industries. These confound the identification of the Korean-wave effect because Korea's TV show exports grew dramatically over

²⁰The exports of durable goods substantially increased until 2004 due to productivity growth, but decreased thereafter with increased FDI.

the same time period.

Specification for consumer goods effects — Accordingly, we pool the observations across HS 4-digit industries and take first-differences of equation (4) over a period of time. For example, $\Delta \ln Exp_{ci} \equiv \ln Exp_{ci,2015} - \ln Exp_{ci,2002}$ if the period of interest is 2002–2015, and similarly $\Delta u_{ci} \equiv u_{ci,2015} - u_{ci,2002}$. This removes destination-industry specific effects that are time invariant. In addition, we control for industry fixed effects χ_i in this time-differenced framework to control for Korea’s industry-specific export trends, as discussed above. With the pooled sample, we test a natural hypothesis that the effect can be stronger on consumer goods compared to capital or intermediate goods, using the following equation:

$$\begin{aligned} \Delta \ln Exp_{ci} = & \chi_i + \beta_1 \cdot ConsumerGoods_i \cdot \Delta \ln TVshowExp_c + \beta_2 \cdot \Delta \ln TVshowExp_c \\ & + \delta \Delta \ln GDP_c + \Delta X_c + \Delta u_{ci} , \end{aligned} \quad (5)$$

where $ConsumerGoods_i$ is a dummy which takes value 1 if i is classified as a consumer good (see Section 2.2 for the classifications) and 0 otherwise. Note that β_2 represents the base effect of Korean TV shows on non-consumer goods, and β_1 the additional effect on consumer goods. This framework is well suited to analyze the current question, because it allows us to exploit the three key variations (country, time, industry) of the data in a single equation while simultaneously controlling for various confounding factors such as industry-specific time trends in Korea’s exports.

Specification for gender-biased preferences — In the HS classification of goods, only clothing industries are given different HS codes (at the 4-digit level) depending on the gender of their consumers. In line with the fact that women have stronger preferences for Korean pop culture than men, we systematically test a related hypothesis that the effect will be stronger on women’s clothing than on men’s wear.

As mentioned previously, Korea’s exports of clothing have been in decline in recent decades due to production offshoring. To control for such confounding effects, we again use the time-differenced framework. Unlike the previous case, we now pool over only the industries that are highly associated with clothing, which is ‘Section XI — Textiles and Textile Articles’ as classified by the UN (see Panel B of Table 3). In this set of industries, HS 61 and 62 (clothing) are final consumer goods, while the rest are mostly intermediate goods (such as textiles) or goods unrelated to the Korean wave (such as carpets and used clothing). The clothing categories (HS 61 and 62) are further classified into women’s or men’s clothing by their 4-digit industries (see Panel C of Table 3). We then construct the dummy ‘ $WomensClothing_i$ ’ (‘ $MensClothing_i$ ’), which takes value 1 if industry i falls in the women’s (men’s) clothing category and 0 otherwise. Thus, the two dummies will take value 0 for all the non-clothing industries (textiles and textile articles). Replacing the consumer goods dummy with the women’s and men’s clothing dummies in equation (5) leads to the following

estimating equation:

$$\begin{aligned} \Delta \ln Exp_{ci} = \chi_i &+ \beta_1 \cdot WomensClothing_i \cdot \Delta \ln TVshowExp_c \\ &+ \beta_2 \cdot MensClothing_i \cdot \Delta \ln TVshowExp_c \\ &+ \beta_3 \cdot \Delta \ln TVshowExp_c + \delta \Delta \ln GDP_c + \Delta X_c + \Delta u_{ci} . \end{aligned} \quad (6)$$

We expect the estimate of β_1 to be positive and larger than that of β_2 (due to the gender-biased effect), and both of them to be larger than β_3 (due to the consumer goods effect).

5 Threats to Identification and Strategies for Robustness Checks

This section addresses several potential threats to identification and proposes strategies for robustness checks. First, a potential concern about the above specifications is that the increased popularity of Korean culture in some destination countries may be correlated with some unobserved factors that improved Korea’s trade relationship with those countries. To control for such destination-specific shocks to the trends of the Korean TV program and merchandise exports, we add country fixed effects ζ_c to equations (5) and (6), which eliminates all the destination-specific variables and leads to the following estimating equations:

$$\Delta \ln Exp_{ci} = \chi_i + \zeta_c + \beta_1 \cdot ConsumerGoods_i \cdot \Delta \ln TVshowExp_c + \Delta u_{ci} , \quad (7)$$

$$\begin{aligned} \Delta \ln Exp_{ci} = \chi_i + \zeta_c &+ \beta_1 \cdot WomensClothing_i \cdot \Delta \ln TVshowExp_c \\ &+ \beta_2 \cdot MensClothing_i \cdot \Delta \ln TVshowExp_c + \Delta u_{ci} . \end{aligned} \quad (8)$$

A second potential concern is that the results may be driven by the possibility that the overall domestic demand for consumer goods and women’s clothing, regardless of the origins of the goods, happened to increase sharply in the countries highly influenced by the Korean wave. To address this concern, in a robustness exercise, we replace the dependent variables in our main specifications (5)–(8) with changes in the destination’s Korean *import shares* out of its total imports in industry i .²¹ We find that the Korean wave increased the *shares* of Korean imports in consumer goods and women’s clothing (relative to non-consumer goods and men’s clothing) in destination countries.

Third, some may suspect that the increase in exports of Korean merchandise and entertainment programs are driven by some unobserved long-run common causal factors. To rebut this, we perform falsification tests by regressing *past* (in the 1990s) decadal changes in goods exports on *future* (in the 2000s) decadal changes in TV program exports, and verify that there are no such spurious effects. The falsification test framework is in part motivated by Autor et al. (2013).

Fourth, some people may argue, to the contrary, that it is Korea’s exports of goods/services that caused the Korean wave.²² As will be shown in Section 6, the Korean wave effects differ across

²¹This specification with the *shares* can be derived from equation (2), by dividing both sides of the equation by E_{ci} , which we proxy with the destination’s total imports in the industry.

²²To counter this, we also note that Japan exports more higher quality goods/services than South Korea to most

genders and types of goods, which is difficult to reconcile with such a reverse causality argument. To illustrate, it is highly unlikely that the quality of women’s clothing (originated from Korea) improved more than men’s, only in certain countries and not in others, and led women in those countries to have stronger preferences for Korean TV shows.

A fifth threat to identification is that the estimation results could be driven by shocks to the supply side such as productivity growth, possibly synchronized with the growth of the Korean wave. However, as can be seen in Figure 6, it is the intermediate and capital goods industries whose actual productivity and exports increased strongly during the same time period as the Korean wave, while consumer goods exports exhibited mainly downward trends. Nonetheless, as demonstrated below, we find significantly positive effects of TV show exports on consumer goods but no effects on intermediate and capital goods. This strongly supports our proposed demand-side mechanism.

Lastly, it is plausible that without the development of the internet, the Korean wave would not have been as strong and widespread as it is nowadays. At the same time, the internet has also lowered communication and information costs and increased trade relationships. Note, however, that such shocks can be controlled for by the time-differenced framework if they are country-industry time invariant, or by the inclusion of industry and country fixed effects (in trend), as in equations (7) and (8).

6 Results

This section explores implications of the results and robustness of the two tests proposed in Section 4: (i) gender-biased preferences, and (ii) consumer goods effects.

6.1 Gender-biased Preferences: Differential Effects on Women’s versus Men’s Clothing

Given the fact that women spend more time watching Korean TV shows than men, we test whether the Korean wave has larger effects on women’s clothing than on men’s, using the estimating equations (6) and (8) over the pooled sample of HS 4-digit industries in textiles and textile articles. Panel A of Table 5 presents the results, first for the period of 2002–2015 (columns 1 and 2) and then with two stacked periods of 2002–2007 and 2007–2015 (columns 3 and 4, where industry-period FEs are further included).²³ Consistent with our hypothesis, the results in columns 1–4 indicate that the Korean wave has significantly larger positive impacts on women’s clothing exports than on men’s. In particular, the result in column 3 implies that doubling the TV show exports leads

destinations, but the overseas popularity of Korean TV shows and pop music nowadays is incomparably higher than that of Japan’s (certainly, the quality of Japanese pop culture is no less than that of Korea’s, since Korean music and TV show producers have often learned or copied the contents/formats of Japan’s until recently). Furthermore, one can easily find a number of cases in which a country’s export flows of goods/services do not necessarily induce the spread of the exporter’s pop culture (e.g., China, India, Japan, Germany, Sweden, etc.).

²³We choose 2007 instead of 2008 or 2009 to avoid distortions created by the 2008 financial crisis. The two control variables, ΔRTA_c and $\Delta Embassy_c$, are dropped, because the RTA and embassy status of Korea with most trading partners did not change during this period.

to a 28% increase in women’s clothing exports, while the effect is only 13% for men’s. In addition, the insignificant estimates of the coefficient of $\Delta \ln TVshowExp_c$ suggest there are no Korean wave effects on textiles (which are mostly intermediate goods). This is in line with our hypothesis regarding the differential effects of the Korean wave on consumer versus non-consumer goods.

Importantly, we face a tradeoff with the inclusion of country FEs — controlling for destination-specific idiosyncratic shocks absorbs the destination-specific mean growth rates in merchandise exports and Korean TV show exports. As a result, compared to the benchmark results, the statistical precision of the key estimates slightly increased, while the magnitudes decreased modestly. Nonetheless, the effects continue to be much stronger on women’s than men’s clothing.

Next, we conduct falsification tests by regressing *past* (1991–2001) changes in clothing and textile exports on *future* (2003–2013) changes in TV show exports (we use the period 1991–2001 for the other control variables as well).²⁴ Panel B of Table 5 shows that there is no statistically significant correlation between changes in Korea’s clothing exports in the 1990s and changes in Korea’s future TV show exports in the 2000s, and there is no systematic difference in the effects on women’s versus men’s clothing exports. This is true in both long-period growth regressions (1991–2001) and stacked-period regressions (1991–1996, 1996–2001). These falsification test results thus alleviate the concern that our results might be driven by some long-run coincidental factors.

As discussed in Section 5, some people may argue that the results are driven by the possibility that the countries highly influenced by the Korean wave happened to import increasingly more women’s clothing from the world. To rebut this, Table 6 explores the *share* specifications in which the dependent variable is normalized by changes in the destination’s imports from the world within the same industry. In other words, the dependent variable is now the decadal change in the destination’s Korean import shares in an industry. The result in column 1 implies that doubling Korea’s TV show exports increases the destination’s Korean import shares in women’s clothing by 21%, while the effects on men’s clothing are not significant. The results are again robust to the inclusion of country FEs (column 2) and to the stacked-period specifications (columns 3–4). Relative to the level regression in Table 5, the share regression results clearly establish the statistical significance of the gender-biased effect. Furthermore, the falsification test results in Panel B of Table 6 show that the key estimates are not statistically significant. These results thus address the above concern and further ensure the robustness of our results.

Overall, the results in this section provide strong evidence of the demand-side driven mechanism that the Korean wave has changed consumers’ preferences and their consumption behaviors. That the effects are stronger for products used by women is especially revealing of this preference mechanism, because such gender-biased trade effects within a fine product category is difficult to reconcile with supply-side explanations as well as the reverse causality argument discussed in Section 5.

²⁴The exception is the number of overseas Koreans, for which we use the future period values (2003–2013). This is because the data are not available for the period of 1991–2001. The results are similar if we simply drop this variable from the regression.

6.2 Consumer Goods Effects

In this section, we pool observations across all HS 4-digit industries and estimate equation (5) in two different versions: one with the general consumer goods dummy and another one with the dummy indicating *Korean wave goods*, where the latter is the subset of consumer goods whose sales overseas are documented to have been directly promoted by the Korean wave (see Section 2.2 for information about the goods classification).

The two exercises serve the following purposes. First, they provide an overall assessment of the Korean-wave effect across all industries. Korean government agencies and cultural and economic research institutes have made tremendous efforts to investigate the economic impacts of the Korean wave. While their reports focus on documentation and surveys, we provide systematic econometric analysis of the overall impact of the Korean wave on Korea’s exports. Second, comparing the results of the two exercises provides cross-validation of the reliability of our analysis. If the preference mechanism is the key to driving the results, we expect the estimated effect for *Korean wave goods* to be larger and more significant than the one for consumer goods.

Consumer goods dummy specification — Column 1 of Table 7 reports estimates of equation (5) over the period 2002–2015. The result indicates that doubling the TV show exports induces a 17% increase in consumer goods exports, while there is no significant effect on non-consumer goods. Given that Korea’s TV show exports grew more than tenfold over the period, the implied economic impacts on consumer goods are substantial. The specification of column 2 adds country FEs, and we find that the effect on consumer goods remains statistically significant. The same conclusion continues to hold in columns 3–4 for stacked-period regressions (2002–2007 and 2007–2015).

Panel B of Table 7 presents results of falsification tests regressing *past* (1991–2001) changes in exports of HS 4-digit industries on *future* (2003–2013) changes in TV show exports. We find that the key estimates are all arbitrarily close to zero and statistically not significant. This suggests that the main results are not driven by some spurious correlations affecting the two series for decades.

Table 8 shows that our results are also robust to the *share* specifications: the result in column 1 suggests that doubling the Korean TV show exports raises the destination’s Korean import shares in consumer goods by 10%, while the effects are not significant on non-consumer goods. The results with the country FEs and the stacked-period specifications (columns 2–4) continue to show significantly positive impacts on consumer goods. Moreover, the falsification test results in Panel B imply there are no spurious long-run correlations.

Overall, our findings in Tables 7 and 8 provide systematic evidence that the spread of Korean pop culture significantly increased exports of Korean consumer goods.

Korean-wave goods dummy specification — Table 9 presents the estimation results of equations (5) and (7) using the *KoreanWaveGoods_i* dummy in place of *ConsumerGoods_i*. The benchmark result for the period 2002–2015 suggests that doubling Korean TV show exports raises the exports of *Korean wave goods* by 26% (column 1). Notably, the magnitude of this effect is larger than the estimated effect on general consumer goods (17%, *cf.* column 1 of Table 7). This

finding, where the effect on the *Korean wave goods* is larger than on consumer goods, holds true for all the specifications in columns 1–4 of Table 9 compared with Table 7. These results thus support our hypothesis that the *Korean wave goods* are more responsive than the whole set of consumer goods to the spread of Korean pop culture.

The corresponding falsification tests in Panel B of Table 9 confirm there are no systematic spurious effects of the *future* TV show export growth on the *past* changes in Korea’s exports of *Korean wave goods*. In addition, the *share* specification results in Table 10 show that increased exposure to Korean TV shows significantly raises the destination’s Korean import shares in the *Korean wave goods* industries. Importantly, the estimated *share* effects on *Korean wave goods* are again larger than for general consumer goods (columns 1–4 in Table 10 versus Table 9), consistent with the finding above.

Overall, the results in this section demonstrate the presence of significantly positive effects of the Korean wave on exports of consumer goods as opposed to capital or intermediate goods, which highlights the important role of the demand-side mechanism. Moreover, the fact that the estimates for *Korean wave goods* are larger than those for consumer goods adds further weight to the proposed preference hypothesis. It is also worthwhile to note that during the 2002–2015 period, Korea’s exports of consumer goods in general declined relative to its exports of capital and intermediate goods. This makes the finding of positive cultural effects on exports of consumer goods even more compelling. To a certain extent, the Korean wave helped buck the downward trend of consumer goods exports, particularly with *Korean wave goods* leading the way.

6.3 Discussion: Diffusion of Preferences

In the introduction, we proposed two channels through which the Korean wave impacts Korea’s exports in relevant industries: (i) diffusion of preferences, and (ii) advertising based on the Korean wave. We could argue that without the diffusion of preferences, the advertising efforts cannot lead to such phenomenal impacts. To illustrate, despite substantial efforts by Korean cosmetic firms to penetrate lucrative markets, such as France, UK, Germany and Canada, where Korean pop culture is not popular, they have failed to enlarge their market shares because the demand is weak and because advertising using Korean actresses is not effective. In contrast, in the destination markets where Korean soap operas are highly popular, they find it extremely lucrative to ride on the Korean wave by involving Korean stars in marketing activities. Thus, conceptually, the diffusion of preferences stemming from Korean pop culture develops first before the advertising channel becomes effective.

To support this argument, we look at products/services that are rarely advertised by Korean firms through the mass media. First, Korean clothing is rarely advertised in foreign countries.²⁵ Rather, it appears that a ‘made in Korea’ or ‘Korean style’ label is an important factor to spur

²⁵Though there are some famous Korean clothing brands, the products are typically made in and exported from China or Vietnam. Clothing made in and exported from South Korea mostly consists of individual designer clothes, as can be seen in Taobao, the largest online shopping mall in China.

sales in foreign countries, thus associated with the diffusion of preferences channel (Obermiller and Spangenberg, 1989; Verlegh and Steenkamp, 1999). Indeed, as demonstrated in Tables 5 and 6, the growth in Korean TV show exports has significantly positive effects on the growth in Korean clothing exports. More importantly, one can see that the estimated effects on women’s clothing (rarely advertised through the mass media) and beauty products (heavily advertised by famous Korean actresses) are both economically large. This is especially revealing of the strong presence of our first channel, the diffusion of preferences.

Second, using cross-country panel data on South Korea’s outward FDI, we examine the Korean wave impacts on services that are not advertised through the mass media in foreign countries. The list of sectors is given in Table A.1. As in the case of *Korean wave goods*, there are particular service sectors whose sales have reputedly benefited from the Korean wave. For example, Table 1 indicates that more than 25% of foreigners surveyed wanted to have Korean medical services and learn the Korean language, and more than 50% of them wanted to eat and purchase Korean foods, after experiencing Korean pop culture. Using the same sources of information that helped define the *Korean wave goods*, we similarly classify Korea’s FDI sectors into the *Korean wave service* sectors and *non-Korean wave service* ones. The *Korean wave service* sectors include Korean restaurants, grocery stores, K-pop concerts and performances/events of Korean celebrities, aesthetic and medical clinics, language institutes, hair salons, etc., which are set up overseas by Koreans. On the other hand, sectors such as agriculture, manufacturing, mining and construction are classified as *non-Korean wave service* sectors.

If the Korean wave has induced the diffusion of foreign consumers’ preferences, we expect Korea’s FDI in the *Korean wave service* sectors to be positively affected by the Korean TV show exports. To test this, we pool observations across sectors and allow the Korean wave effect to differ across the set of *Korean wave service* sectors and the set of *non-Korean wave service* sectors. Unlike the previous analysis for merchandise trade, we do not apply the time-differenced framework in this case. This is because Korea’s FDI data at the sectoral level across destinations are sparse with many zero entries, so taking log difference across two years leads to a large drop in the sample size. Instead, we run the FDI regression in levels, but control for sector-year and destination FEs. This allows us to control for sector-year and destination-specific unobserved confounding factors. Table A.2 reports the estimation results. During the 2002–2015 period, lagged Korean TV show exports had significantly positive effects on Korean FDI in the *Korean wave service* sectors, with elasticity of 12%, but had no effect on the other sectors. The corresponding falsification tests in columns 3–4, showing no significant correlation between Korea’s *past* FDI data and future TV show exports, indicate that our findings are not driven by some long-run common factors behind the two variables.

To summarize, this section demonstrates that even goods and services that are rarely advertised through the mass media can be highly influenced by the Korean wave. Our findings on the significantly positive effects of TV show exports on the *Korean wave service* FDI sectors especially reinforce the evidence for diffusion of preferences.

7 Conclusion

Identifying a causal link from culture to international trade flows is difficult. This is because the notion of culture is so broad. Culture tends to develop slowly over time, thus being highly correlated with geographic factors. There are potentially many other factors which affect both culture and trade flows. This is especially true when the channel works through consumer preferences. Nevertheless, we were able to identify such effects, thanks to the unique phenomenon whereby Korean pop culture dramatically spread across many countries (regardless of physical distance, religion, language, and ethnicity differences) in a short time frame. The key sources of identification come from the cross-country and time variations of Korea's TV program exports, plus the variations across products when combined with disaggregated trade flows. Exploiting such variations, our systematic frameworks in first-differences with various fixed effects allow us to capture the cultural effects and demonstrate robustness of the estimates against possible endogeneity issues.

We find strong evidence that increased exposure to Korean pop culture has changed foreign consumer preferences for Korean goods/services, and increased Korea's exports in relevant industries. First, we find that the impact is stronger for products/services designed for women, in line with the documented fact that women spend more hours watching Korean TV programs and hence are more intensively exposed to Korean cultural contents. Second, we show that the effects are significantly positive for consumer goods, but insignificant for capital or intermediate goods. This is consistent with the fact that consumer goods embody stronger cultural contents. These systematic differences in the impact across products support the demand-side preference mechanism, because it is difficult to reconcile these patterns with supply-side shifts or reverse causality. Third, we find that the effects are significant even for goods and services which are rarely advertised through the mass media by Korean firms overseas, which further highlights the preference-diffusion mechanism.

To offer an indication of the overall economic impact of the Korean wave based on our results, recall that the result in column 1 of Table 7 implies that a one percent increase in TV show exports increases exports of Korean consumer goods by 0.165%. In addition, note that Korean TV show exports increased from US\$18.92 million in 2001 to US\$336.019 million in 2014, while the export value of Korean consumer goods was US\$31.443 billion in 2002 (recall that we used 1-year-lagged TV show exports). Thus, the implied trade-creating impact of TV show exports is around US\$18.81 billion. So, by merchandise trade alone, the Korean wave contributed to South Korea's economy by about 3.1% of GDP in 2002 (or 1.4% of GDP in 2015).²⁶

This paper suggests a potentially important policy implication: promoting a country's culture and country image can be an effective tool for export promotion, since it can dramatically reshape foreign consumer preferences for products and services originating from the country. This can boost the foreign demand in broad industries, thereby lowering market penetration costs (Arkolakis, 2010).

²⁶The GDP of South Korea was US\$609.02 billion in 2002 (and US\$1,383 billion in 2015).

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A Data Appendix

A.1 South Korea’s merchandise exports and outward FDI

Bilateral imports from South Korea at the HS 4-digit product level were downloaded from the UN Comtrade Database for the period of 1991–2015. Sector-specific outward FDI flows (20 sectors) of South Korea to each destination for the period of 1991–2015 came from the Export-Import Bank of Korea. See <https://stats.koreaexim.go.kr/odisas.html>.

A.2 Visitors to Korea

We also use cross-country panel data on the number of female and male visitors to Korea (2003–2015), provided by Korea Tourism Organization.

A.3 Gravity variables

Data on GDP (current US\$), GDP per capita (current US\$), and population were downloaded from the World Development Indicator of the World Bank. Distance between two countries is measured by *distw* from CEPII; in particular, the measure calculates the weighted average distance between the biggest cities of two countries, using population shares of the cities as weights. The information on RTA is based on the RTA dataset maintained by José de Sousa, and supplemented by the CEPII data on RTA.

We construct a dummy variable indicating whether the Korean embassy exists in a given country and a year, for the period 2001–2014, based on the annual reports “Diplomatic White Paper” published annually by South Korea’s Ministry of Foreign Affairs.

The size of overseas Koreans was retrieved from the “Report on the present state of overseas Koreans,” published by South Korea’s Ministry of Foreign Affairs. This report is published every two years (1997, 1999, . . . , 2015). We intrapolated the series linearly when the data for two adjacent odd years were available; i.e., $Korean_t = (Korean_{t-1} + Korean_{t+1})/2$. As indicated, this series is available only from year 1997 onward.

Exchange rates were obtained from the Penn World Table, and supplemented by the World Bank data when the whole exchange rate series for a country was missing from the Penn World Table. The cross exchange rate (Korean won / national currency) was calculated from the Korean Won/USD and the national currency/USD exchange rates.

A.4 Concordance of HS and BEC

The UN provides concordance between the HS 6-digit and the BEC codes. Given this concordance, we classify each HS 6-digit as consumer goods or non-consumer goods (where the cluster of consumer goods is as indicated in Table 2). We then further classify each HS 4-digit industry as consumer goods if all of the HS 6-digit sub-industries under a HS 4-digit industry are consumer goods, as

non-consumer goods if all of the HS 6-digit sub-industries under a HS 4-digit industry are non-consumer goods, and double-matching otherwise. About 10% of the HS 4-digit industries are in the double-matching category. We drop such double-matching products from our main analysis, but all results are robust to the inclusion of double-matching products.

A.5 Popularity Index

To provide a summary of how popular Korean culture is across countries, we construct a popularity index that incorporates the information on Korean TV show exports and also various Korean government agency reports that document the situation of the Korean wave in more than 100 countries. The documents used include: (1) “2015 Global Trend in Korean Wave,” published by the Ministry of Foreign Affairs and the Korea Foundation (MOFA, 2015), (2) “2015 Korean Wave White Paper,” published by the Korea Foundation for International Culture Exchange (KOFICE, 2015a), and (3) various reports and articles provided by the Korea Trade-Investment Promotion Agency (KOTRA, 2011; KOTRA and KOFICE, 2015), the Korea Creative Content Agency (KOCCA),²⁷ and the Korea International Trade Association (KITA).²⁸

For example, these documents provide the audience ratings of popular Korean soap operas in each country, the viewership on major internet video platforms and the demographic composition of viewers. The reports also provide general observations on the Korean wave in each country — e.g., how easily one can hear K-pop music on the streets, how popular and widespread Korean restaurants are, and what the country’s media say about the Korean pop culture and its associated celebrities.

Based on these reports, we classify countries into one of the five categories. This provides a cross-section of ratings for over 100 countries as of 2015 (since most of the documents relied upon were published in 2015).

Level 1 (Not Interested): Most people in the country are not interested in Korean TV shows or K-pop music, and are not aware of the Korean wave phenomenon (47 countries belong to this category: e.g., Austria, Germany, India, Pakistan, Spain, Sweden, Switzerland and UK).

Level 2 (Recognized): K-pop music (or Korean soap operas) are very popular among a small fraction of the population, to the degree that national media give major coverage of the phenomenon (25 countries belong to this category: e.g., Argentina, Canada, Chile, France, Israel, Mexico, Morocco, Russia, UAE, USA and Zimbabwe).

Level 3 (Somewhat Popular): Korean pop culture is moderately popular among the majority of the population. The majority have seen Korean soap operas, and K-pop music is highly popular among teens and young adults (14 countries belong to this category: e.g., Bolivia, Bulgaria, Hungary, Iran, Kyrgyzstan, Paraguay, Romania, Tajikistan and Ukraine).

Level 4 (Popular): Almost everyone in the country is likely to say that Korean soap operas and K-pop music are very popular. Due to their popularity, major channels of the country have

²⁷<http://www.kocca.kr>.

²⁸<http://iit.kita.net>.

been airing Korean TV shows during prime time slots for many years (7 countries belong to this category: Cuba, Ecuador, El Salvador, Laos, Panama, Peru and Uzbekistan).

Level 5 (Very Popular): The Korean wave started in these countries between 1997 and 2003 without any promotion efforts by Korea. Numerous Korean drama series have been extremely popular, to the extent that the government of the importing country publicly expresses concerns over the effects of the Korean wave on its citizens (15 countries belong to this category: Brunei, Cambodia, China, Hong Kong, Indonesia, Kazakhstan, Japan, Malaysia, Mongolia, Myanmar, Philippines, Singapore, Taiwan, Thailand and Vietnam).

Table 1: Survey results by KOFICE (2015b)

Question:
What Korean products do you wish to purchase, after experiencing Korean pop culture (TV shows, K-pop music, and movies)?
Responses:
Want to eat Korean food (55%)
Want to visit Korea (52%)
Want to purchase Korean manufactured foods (51%)
Want to purchase Korean mobile phones (47%)
Want to purchase Korean products in general (45%)
Want to purchase Korean home appliances (42%)
Want to purchase Korean beauty products (41%)
Want to purchase Korean clothes (40%)
Want to purchase Korean jewelry and accessories (37%)
Want to experience Korean traditions (36%)
Want to learn Korean language (33%)
Want to purchase Korean cars (30%)
Want to learn Tae Kwon Do (28%)
Want to have a health/medical service in Korea (26%)
Want to buy Korean alcoholic beverages (25%)

Notes: Total 6500 foreign respondents residing in the following countries: Australia (400), Brazil (400), China (600), France (400), Indonesia (400), Japan (600), Malaysia (600), Russia (400), South Africa (400), Taiwan (600), Thailand (400), UAE (400), UK (400), and USA (500).

Table 2: UN Broad Economic Categories

1 - Food and beverages
11 - Primary
111 - Mainly for industry
112 - Mainly for household consumption
12 - Processed
121 - Mainly for industry
122 - Mainly for household consumption
2 - Industrial supplies not elsewhere specified
21 - Primary
22 - Processed
3 - Fuels and lubricants
31 - Primary
32 - Processed
321 - Motor spirit
322 - Other
4 - Capital goods (except transport equipment), and parts and accessories thereof
41 - Capital goods (except transport equipment)
42 - Parts and accessories
5 - Transport equipment and parts and accessories thereof
51 - Passenger motor cars
52 - Other
521 - Industrial
522 - Non-industrial
53 - Parts and accessories
6 - Consumer goods not elsewhere specified
61 - Durable
62 - Semi-durable
63 - Non-durable
7 - Goods not elsewhere specified
99 - All categories

Note: Consumer goods are highlighted in boldface.

Table 3: Harmonized System (HS) Classification Codes for Selected Industries

Panel A. <i>Korean Wave Goods</i> ***		Panel B. Textiles and Textile Articles (UN Classification, Section XI)	
HS code	Description	HS code	Description
16	Meat, fish and seafood food preparations nes	50	Silk
17	Sugars and sugar confectionery	51	Wool, animal hair, horsehair yarn and fabric thereof
18	Cocoa and cocoa preparations	52	Cotton
19	Cereal, flour, starch, milk preparations and products	53	Vegetable textile fibres nes, paper yarn, woven fabric
20	Vegetable, fruit, nut, etc., food preparations	54	manmade filaments
21	Miscellaneous edible preparations	55	manmade staple fibres
22	Beverages, spirits and vinegar	56	Wadding, felt, nonwovens, yarns, twine, cordage, etc.
3304	Beauty, make-up and skin care preparations	57	Carpets and other textile floor coverings
3305	Hair preparations	58	Special woven or tufted fabric, lace, tapestry, etc.
3307	Shaving and toilet preparations nes, deodorizers	59	Impregnated, coated or laminated textile fabric
3402	Organic surface active agent, preparation, except soap	60	Knitted or crocheted fabric
4202	Trunks, suit-cases, camera cases, handbags, etc.	61	<i>Articles of apparel, accessories, knitted or crocheted</i>
4203	Clothing, accessories of leather, composition leather	62	<i>Articles of apparel, accessories, not knitted or crocheted</i>
61	Articles of apparel, accessories, knitted or crocheted	63	Other made textile articles, sets, worn clothing, etc.
62	Articles of apparel, accessories, not knitted or crocheted		
7113	Jewelry and parts, containing precious metal		
7117	Imitation jewelry	Panel C. Women's and Men's Clothing (HS 61 & 62)	
8415	Air conditioning equipment, machinery	HS code	Description
8418	Refrigerators, freezers and heat pumps nes	6102	Women's or girls' overcoats, capes, wind-jackets, etc., knitted or crocheted
8450	Household, laundry-type washing machine, washer-dryer	6104	Women's or girls' suits, dresses, skirts, etc., knitted or crocheted
8517	Electric apparatus for line telephony, telegraphy	6106	Women's or girls' blouses, shirts, etc., knitted or crocheted
8528	Television receivers, video monitors, projectors	6108	Women's or girls' underwear, nightwear, etc., knitted or crocheted
8703	Motor vehicles for transport of persons (except buses)	6202	Women's or girls' overcoats, capes, wind-jackets, etc., not knitted or crocheted
		6204	Women's or girls' suits, dresses, skirts, etc., not knitted or crocheted
		6206	Women's or girls' blouses, shirts, etc., not knitted or crocheted
		6208	Women's or girls' underwear, nightwear, etc., not knitted or crocheted
		6101	Men's or boys' overcoats, capes, wind-jackets, etc., knitted or crocheted
		6103	Men's or boys' suits, jackets, trousers, etc., knitted or crocheted
		6105	Men's or boys' shirts, knitted or crocheted
		6107	Men's or boys' underwear, nightwear, etc., knitted or crocheted
		6201	Men's or boys' overcoats, capes, wind-jackets, etc., not knitted or crocheted
		6203	Men's or boys suits, jackets, trousers, etc., not knitted or crocheted
		6205	Men's or boys' shirts, not knitted or crocheted
		6207	Men's or boys' underwear, nightwear, etc., not knitted or crocheted

***The HS 4-digit industries that fall under the above clusters and that are also consumer goods.

Table 4: Gender-biased Preferences: Cosmetic Exports and Female versus Male Visitors to Korea

	Cosmetic product exports			Percentage of Female visitors		
	(1)	(2)	(3)	(4)	(5)	(6)
	year-FE	country-FE	country-FE	year-FE	country-FE	country-FE
			<i>k-wave destinations</i>			<i>k-wave destinations</i>
$\ln TV\ showExp_{c,t-1}$	0.409*** (0.0878)	0.235*** (0.0737)	0.413*** (0.0855)	0.0598*** (0.0173)	0.00934* (0.00530)	0.0410*** (0.0115)
$\ln GDP_{c,t}$	0.273*** (0.0828)	1.750*** (0.274)	1.409*** (0.256)	-0.155*** (0.0280)	0.178*** (0.0159)	0.200*** (0.0330)
$\ln Dist_c$	-0.0993 (0.157)			-0.0740 (0.0470)		
$RTA_{c,t}$	-0.458 (0.427)	0.465*** (0.0938)	0.328*** (0.118)	0.00526 (0.0476)	0.0816*** (0.0160)	-0.0153 (0.0159)
$Embassy_{c,t}$	0.602 (0.678)	0.290 (0.363)	-4.428** (1.986)	-0.146 (0.106)	0.0405 (0.0890)	
$\ln Koreans_{c,t}$	-0.0806 (0.112)	-0.0775 (0.236)	-0.120 (0.278)	0.0617*** (0.0237)	0.0403 (0.0309)	-0.120*** (0.0183)
$\ln ExRate_{c,t}$		-0.117 (0.426)	0.291 (0.385)		0.0552 (0.0857)	0.162*** (0.0374)
cons.	3.189* (1.698)	-27.04*** (3.855)	-22.15*** (3.979)	6.901*** (0.808)	0.149 (0.269)	-0.537 (0.599)
Obs.	1604	1383	195	403	391	103
R^2	0.671	0.869	0.880	0.748	0.973	0.924

Notes: PPML estimation results. Each observation is a country-year. Standard errors are clustered by country for the year-FE regressions, and by year for the country-FE regressions. For columns 1-3, the dependent variable is Korea's exports of cosmetic products; for columns 4-6, it is percentage of female visitors from the origin country to South Korea. '*k-wave destinations*' represents the group of countries which imported more than 5,000 TV show episodes during 2001–2014 (each episode typically runs 30 min–1 hour). The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 5: Korea's Exports of Women's versus Men's Clothing
Dependent variable: decadal changes in exports across HS 4-digit textile and textiles article industries (in log)

	Panel A. For period of exposure				Panel B. Falsification tests for period before exposure			
	2002–2015		stacked (2002–2007, 2007–2015)		1991–2001		stacked (1991–1996, 1996–2001)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>WomensClothing_i</i> $\times \Delta \ln TV show Exp_c$	0.345** (0.137)	0.227*** (0.0562)	0.275*** (0.0734)	0.208*** (0.0486)	0.0531 (0.126)	0.0627 (0.0962)	-0.0193 (0.0612)	-0.0186 (0.0474)
<i>MensClothing_i</i> $\times \Delta \ln TV show Exp_c$	0.272*** (0.0895)	0.186*** (0.0533)	0.132* (0.0759)	0.147*** (0.0543)	-0.192 (0.216)	-0.189 (0.127)	0.0181 (0.0583)	-0.00674 (0.0441)
$\Delta \ln TV show Exp_c$	0.0497 (0.0486)		0.0292 (0.0355)		-0.0157 (0.0598)		0.0662** (0.0279)	
$\Delta \ln GDP_c$	0.922*** (0.224)		1.126*** (0.230)		0.769* (0.381)		1.088*** (0.240)	
$\Delta \ln ExRate_c$	0.0715 (0.249)		0.267 (0.198)		-0.106* (0.0534)		-0.348*** (0.0867)	
$\Delta \ln Koreans_c$	0.112 (0.156)		0.130 (0.0799)		0.0493 (0.112)		0.0339 (0.102)	
cons.	-2.232*** (0.190)	-0.263 (0.272)	-0.629 (0.634)	1.115 (0.865)	-2.860*** (0.243)	-3.561*** (0.367)	-2.190*** (0.407)	-1.914*** (0.369)
Obs.	2768	3888	7215	8453	1527	1528	4548	4581
R^2	0.184	0.256	0.123	0.126	0.207	0.241	0.150	0.180
Industry FE	Y	Y			Y	Y		
Industry \times Period FE			Y	Y			Y	Y
Country FE	N	Y	N	Y	N	Y	N	Y

Notes: OLS estimation of equations (6) and (8). Each observation is a destination country and a HS 4-digit industry (and a period for the two-period-stacked regressions). The sample is pooled over all HS 4-digit industries under Section XI (textiles and textile articles) classified by the UN. Falsification tests explore the relationship between the *future* decadal changes (in the 2000s) in Korea's TV show exports and the *past* decadal changes (in the 1990s) in merchandise exports. Standard errors are clustered by export destination for columns (1), (3), (5), and (7), and robust standard errors are reported in columns (2), (4), (6), and (8). The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 6: Destinations' Korean Import Shares in Women's versus Men's Clothing
Dependent variable: decadal changes in import shares across HS 4-digit textile and textiles article industries (in log)

	Panel A. For period of exposure				Panel B. Falsification tests for period before exposure			
	2002–2015		stacked (2002–2007, 2007–2015)		1991–2001		stacked (1991–1996, 1996–2001)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>WomensClothing_i</i> $\times \Delta \ln TV showExp_c$	0.212** (0.102)	0.135*** (0.0491)	0.151** (0.0678)	0.112** (0.0457)	-0.101 (0.0727)	-0.0853 (0.0665)	-0.0305 (0.0488)	-0.0409 (0.0427)
<i>MensClothing_i</i> $\times \Delta \ln TV showExp_c$	0.0858 (0.0932)	0.0544 (0.0571)	0.0420 (0.0786)	0.0587 (0.0547)	-0.283* (0.148)	-0.265** (0.111)	-0.0435 (0.0517)	-0.0523 (0.0428)
$\Delta \ln TV showExp_c$	0.0213 (0.0298)		0.0650*** (0.0211)		-0.00679 (0.0421)		0.0283 (0.0197)	
$\Delta \ln ExRate_c$	0.742** (0.285)		0.542*** (0.175)		0.119*** (0.0389)		-0.0128 (0.0655)	
$\Delta \ln Koreans_c$	0.0600 (0.109)		0.0737 (0.0677)		0.201* (0.117)		0.145 (0.0967)	
cons.	-1.544*** (0.115)	-0.596** (0.245)	-0.0307 (0.497)	1.150 (0.862)	-3.290*** (0.248)	-2.966*** (0.331)	-1.272*** (0.152)	-1.025*** (0.296)
Obs.	2824	3888	7329	8453	1528	1528	4581	4581
R^2	0.158	0.224	0.101	0.116	0.237	0.273	0.137	0.171
Industry FE	Y	Y			Y	Y		
Industry \times Period FE			Y	Y			Y	Y
Country FE	N	Y	N	Y	N	Y	N	Y

Notes: OLS estimation of equations (6) and (8) using changes in destination's Korean import shares as dependent variable. Each observation is a destination country and a HS 4-digit industry (and a period for the two-period-stacked regressions). The sample is pooled over all HS 4-digit industries under Section XI (textiles and textile articles) classified by the UN. Standard errors are clustered by export destination for columns (1), (3), (5), and (7), and robust standard errors are reported in columns (2), (4), (6), and (8). The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 7: Korea's Exports of Consumer versus Non-consumer Goods
Dependent variable: decadal changes in exports across all HS 4-digit industries (in log)

	Panel A. For period of exposure				Panel B. Falsification tests for period before exposure			
	2002–2015		stacked (2002–2007, 2007–2015)		1991–2001		stacked (1991–1996, 1996–2001)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$ConsumerGoods_i$ $\times \Delta \ln TVshowExp_c$	0.165*** (0.0393)	0.112*** (0.0145)	0.0831*** (0.0283)	0.0684*** (0.0126)	0.0286 (0.0490)	0.0194 (0.0325)	0.00177 (0.0220)	-0.00548 (0.0138)
$\Delta \ln TVshowExp_c$	-0.00132 (0.0315)		-0.0203 (0.0266)		-0.0365 (0.0458)		0.0386 (0.0266)	
$\Delta \ln GDP_c$	0.752*** (0.159)		1.051*** (0.183)		0.609* (0.337)		0.988*** (0.173)	
$\Delta \ln ExRate_c$	-0.461*** (0.167)		0.0761 (0.135)		0.0208 (0.0614)		-0.0202 (0.0687)	
$\Delta \ln Koreans_c$	0.229** (0.109)		0.178** (0.0743)		-0.0388 (0.113)		-0.0307 (0.0766)	
cons.	3.856*** (0.0968)	4.613*** (0.379)	-0.708 (0.936)	0.189 (0.881)	1.170*** (0.213)	1.229*** (0.148)	-0.0982 (0.0947)	-1.351*** (0.302)
Obs.	17088	23244	44694	52153	8434	8441	25374	25549
R^2	0.244	0.276	0.152	0.150	0.294	0.313	0.176	0.189
Industry FE	Y	Y			Y	Y		
Industry \times Period FE			Y	Y			Y	Y
Country FE	N	Y	N	Y	N	Y	N	Y

Notes: OLS estimation of equations (5) and (7). Each observation is a destination country and a HS 4-digit industry (and a period for the two-period-stacked regressions). The sample is pooled over all HS 4-digit industries. Standard errors are clustered by export destination for columns (1), (3), (5), and (7), and robust standard errors are reported in columns (2), (4), (6), and (8). The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 8: Destinations' Korean Import Shares in Consumer versus Non-consumer Goods
Dependent variable: decadal changes in import shares across all HS 4-digit industries (in log)

	Panel A. For period of exposure				Panel B. Falsification tests for period before exposure			
	2002–2015		stacked (2002–2007, 2007–2015)		1991–2001		stacked (1991–1996, 1996–2001)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$ConsumerGoods_i$ $\times \Delta \ln TVshowExp_c$	0.104** (0.0396)	0.0796*** (0.0142)	0.0502** (0.0249)	0.0520*** (0.0124)	-0.0400 (0.0412)	-0.0450 (0.0305)	-0.00342 (0.0180)	-0.0161 (0.0133)
$\Delta \ln TVshowExp_c$	-0.0203 (0.0212)		0.00589 (0.0179)		-0.0341 (0.0461)		0.0108 (0.0160)	
$\Delta \ln ExRate_c$	0.00644 (0.168)		0.236* (0.120)		0.0754** (0.0306)		0.107 (0.0700)	
$\Delta \ln Koreans_c$	0.105 (0.0772)		0.0998 (0.0678)		0.0273 (0.0870)		0.0253 (0.0633)	
cons.	3.675*** (0.0342)	3.532*** (0.400)	-0.440 (0.744)	-0.293 (0.742)	1.177*** (0.131)	1.126*** (0.111)	0.243*** (0.0442)	-1.240*** (0.296)
Obs.	17345	23244	45311	52153	8441	8441	25549	25549
R^2	0.191	0.223	0.117	0.121	0.288	0.306	0.159	0.175
Industry FE	Y	Y			Y	Y		
Industry \times Period FE			Y	Y			Y	Y
Country FE	N	Y	N	Y	N	Y	N	Y

Notes: OLS estimation of equations (5) and (7) using changes in destination's Korean import shares as dependent variable. Each observation is a destination country and a HS 4-digit industry (and a period for the two-period-stacked regressions). The sample is pooled over all HS 4-digit industries. Standard errors are clustered by export destination for columns (1), (3), (5), and (7), and robust standard errors are reported in columns (2), (4), (6), and (8). The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 9: Korea's Exports in *Korean Wave Goods* versus the Rest
Dependent variables: decadal changes in exports across all HS 4-digit industries (in log)

	Panel A. For period of exposure				Panel B. Falsification tests for period before exposure			
	2002–2015		stacked (2002–2007, 2007–2015)		1991–2001		stacked (1991–1996, 1996–2001)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$KoreanWaveGoods_i \times \Delta \ln TVshowExp_c$	0.263*** (0.0597)	0.181*** (0.0207)	0.144*** (0.0376)	0.108*** (0.0191)	0.0140 (0.0608)	-0.00269 (0.0504)	0.00497 (0.0361)	-0.00355 (0.0198)
$\Delta \ln TVshowExp_c$	0.0128 (0.0289)		-0.0142 (0.0249)		-0.0308 (0.0428)		0.0385 (0.0258)	
$\Delta \ln GDP_c$	0.754*** (0.159)		1.051*** (0.183)		0.613* (0.337)		0.988*** (0.173)	
$\Delta \ln ExRate_c$	-0.465*** (0.166)		0.0747 (0.135)		0.0203 (0.0613)		-0.0202 (0.0687)	
$\Delta \ln Koreans_c$	0.230** (0.109)		0.178** (0.0741)		-0.0396 (0.112)		-0.0307 (0.0766)	
cons.	3.837*** (0.0963)	4.584*** (0.381)	-0.723 (0.940)	0.181 (0.882)	1.157*** (0.205)	1.230*** (0.147)	-0.0980 (0.0924)	-1.349*** (0.302)
Obs.	17088	23244	44694	52153	8434	8441	25374	25549
R^2	0.245	0.276	0.152	0.150	0.294	0.313	0.176	0.189
Industry FE	Y	Y			Y	Y		
Industry \times Period FE			Y	Y			Y	Y
Country FE	N	Y	N	Y	N	Y	N	Y

Notes: OLS estimation of equations (5) and (7). Each observation is a destination country and a HS 4-digit industry (and a period for the two-period-stacked regressions). The sample is pooled over all HS 4-digit industries. Standard errors are clustered by export destination for columns (1), (3), (5), and (7), and robust standard errors are reported in columns (2), (4), (6), and (8). The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 10: Destinations' Korean Import Shares in *Korean Wave Goods* versus the Rest
Dependent variable: decadal changes in import shares across all HS 4-digit industries (in log)

	Panel A. For period of exposure				Panel B. Falsification tests for period before exposure			
	2002–2015		stacked (2002–2007, 2007–2015)		1991–2001		stacked (1991–1996, 1996–2001)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$KoreanWaveGoods_i$ $\times \Delta \ln TVshowExp_c$	0.179*** (0.0616)	0.128*** (0.0205)	0.102*** (0.0345)	0.0772*** (0.0190)	-0.0790* (0.0440)	-0.0974** (0.0453)	-0.0163 (0.0235)	-0.0299 (0.0191)
$\Delta \ln TVshowExp_c$	-0.0128 (0.0194)		0.00844 (0.0167)		-0.0361 (0.0424)		0.0116 (0.0146)	
$\Delta \ln ExRate_c$	0.00422 (0.168)		0.235* (0.120)		0.0752** (0.0307)		0.107 (0.0700)	
$\Delta \ln Koreans_c$	0.106 (0.0765)		0.0996 (0.0676)		0.0274 (0.0874)		0.0253 (0.0634)	
cons.	3.665*** (0.0328)	3.511*** (0.402)	-0.446 (0.746)	-0.300 (0.742)	1.181*** (0.124)	1.126*** (0.111)	0.241*** (0.0416)	-1.238*** (0.296)
Obs.	17345	23244	45311	52153	8441	8441	25549	25549
R^2	0.192	0.223	0.117	0.121	0.288	0.306	0.159	0.175
Industry FE	Y	Y			Y	Y		
Industry \times Period FE			Y	Y			Y	Y
Country FE	N	Y	N	Y	N	Y	N	Y

Notes: OLS estimation of equations (5) and (7) using changes in destination's Korean import shares as dependent variable. Each observation is a destination country and a HS 4-digit industry (and a period for the two-period-stacked regressions). The sample is pooled over all HS 4-digit industries. Standard errors are clustered by export destination for columns (1), (3), (5), and (7), and robust standard errors are reported in columns (2), (4), (6), and (8). The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A.1: Korea's FDI Sectors

<i>Korean wave service sectors</i>	
Restaurant	Restaurants and accommodation business
Retail and Wholesale	Grocery stores, retail/wholesale business
Entertainment and Leisure	Concerts, performances, arts, leisure services
Broadcasting	Broadcasting, publishing, communication and information services
Medical	Medical clinics
Education Services	Educational services
Personal Services	Personal services such as hair salons
<i>Non-Korean wave service sectors</i>	
Agriculture	Agriculture, forestry, fisheries
Business management	Business facilities management, business support services
Construction	Construction
Finance	Finance, insurance
International Institutions	International, foreign institutions
Manufacturing	Manufacturing industries
Mining	Mining industries
Public Administration	Public, defense, social security administration
Science and Technology	Services associated with science and technology
Shipping	Shipping, transportation
Leasing and Real Estate	Leasing, real estate business
Electricity and Gas	Electricity, gas, water supply
Waste Management	Waste treatment, environmental restoration

Notes: Data are from the Export-Import Bank of Korea. See <https://stats.koreaexim.go.kr/odisas.html>.

Figure 1: South Korea's TV Program Exports

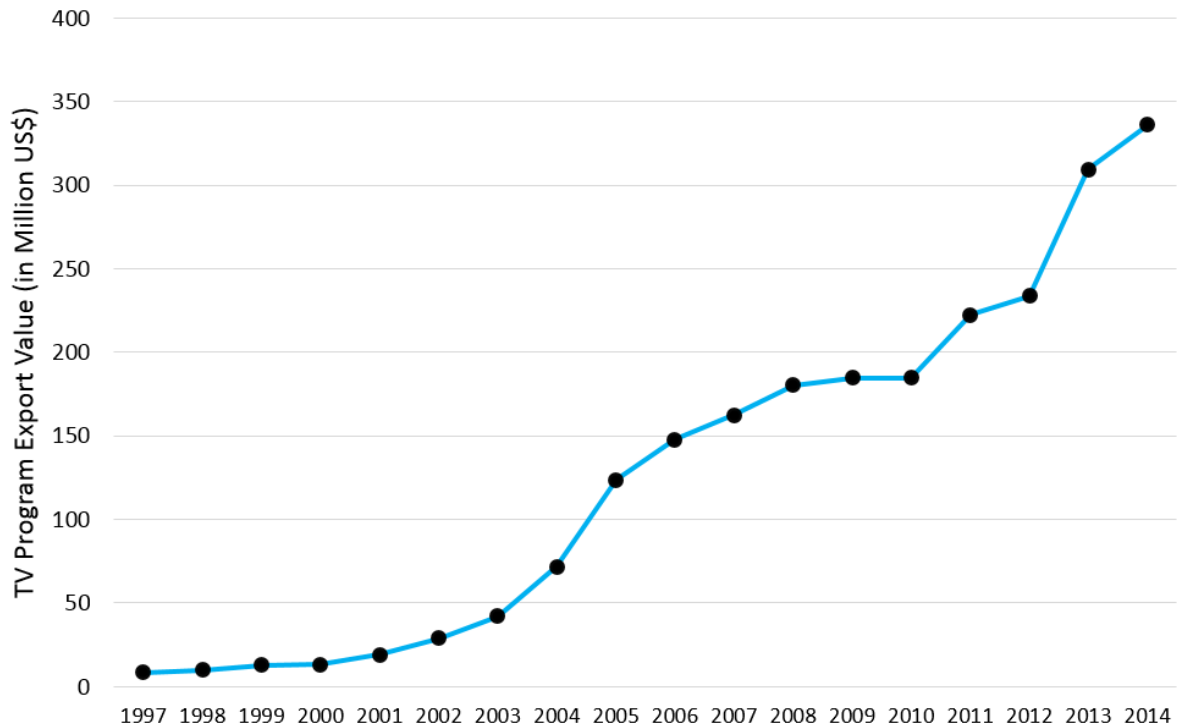


Table A.2: Korea's outward FDI — *Korean wave service* sectors versus the rest

	FDI 2002–2015		Falsification tests: FDI 1991–2001		
	(1)	(2)	(3)	(4)	
$KoreanWaveService_i$	0.110***	0.113***	$KoreanWaveService_i$	0.00160	0.00173
$\times \ln TVshowExp_{c,t-1}$	(0.0204)	(0.0201)	$\times \ln TVshowExp_{c,t+12}$	(0.0405)	(0.0418)
$\ln TVshowExp_{c,t-1}$	0.0225	0.0276	$\ln TVshowExp_{c,t+12}$	-0.0597	-0.0673
	(0.0328)	(0.0352)		(0.146)	(0.165)
$\ln GDP_{c,t}$	-0.588***	-0.456***	$\ln GDP_{c,t}$	-0.0708	-0.0562
	(0.157)	(0.143)		(0.405)	(0.424)
$\ln ExRate_{c,t}$	0.302	-0.0174	$\ln ExRate_{c,t}$	0.153	0.136
	(0.374)	(0.379)		(0.113)	(0.109)
$RTA_{c,t}$	-0.0000652	0.0666	$RTA_{c,t}$		
	(0.0873)	(0.0808)			
$Embassy_{c,t}$	-2.249***		$Embassy_{c,t+12}$	-2.627***	
	(0.538)			(0.539)	
$\ln Koreans_{c,t}$	0.554***		$\ln Koreans_{c,t+12}$	0.526	
	(0.129)			(0.364)	
cons.	18.43***	15.84***	cons.	10.21	8.163
	(3.332)	(3.148)		(6.798)	(7.486)
Obs.	16628	16628	Obs.	9531	9531
R^2	0.497	0.491	R^2	0.661	0.653
Sector \times Year FE	Y	Y	Sector \times Year FE	Y	Y
Country FE	Y	Y	Country FE	Y	Y

Notes: PPML estimation, with country and sector-year fixed effects. Observations include all FDI sectors. Each observation is a sector-country-year. The indicator $KoreanWaveService_i$ equals one if sector i is one of the *Korean wave service* sectors listed in Table A.1. Falsification tests explore the relationship between the *future* changes in Korea's TV show exports and the *past* changes in FDI. The data for the two control variables, $Embassy_{c,t}$ and $\ln Koreans_{c,t}$, are available only since 1995 and 1997, respectively. Thus, we use their future values in the falsification tests. The results when they are dropped from the regression are provided in columns 2 and 4 as robustness checks. Standard errors are clustered by year. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Figure 2: South Korea's TV Program Exports across Selected Destinations (in 2001, 2004, and 2014)

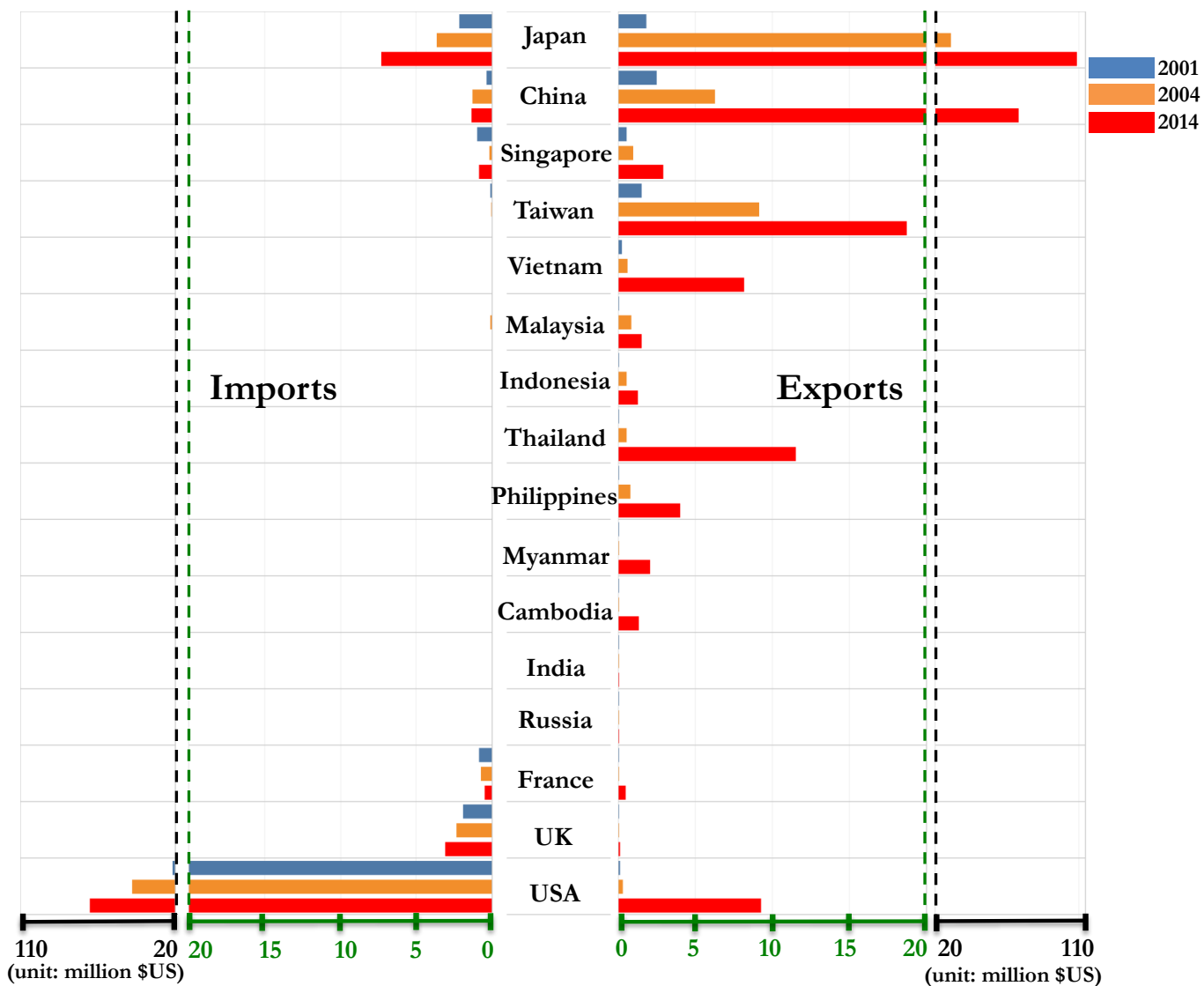


Figure 3: South Korea's Music Exports and Imports

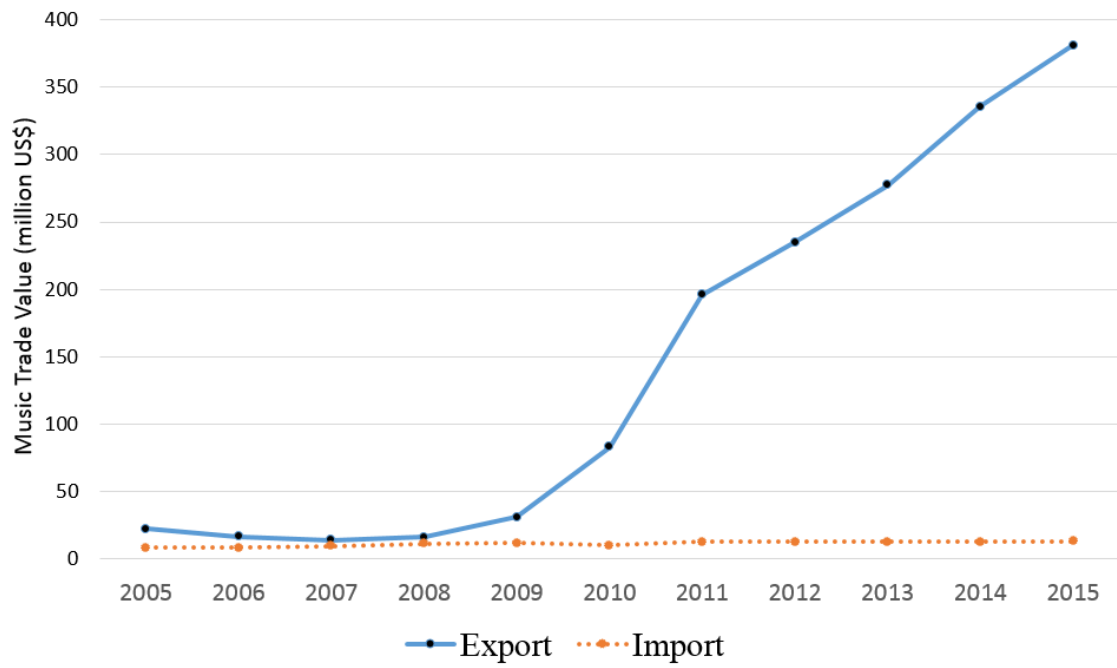


Figure 4: South Korea's Export Growth in Beauty Products to Selected Destinations

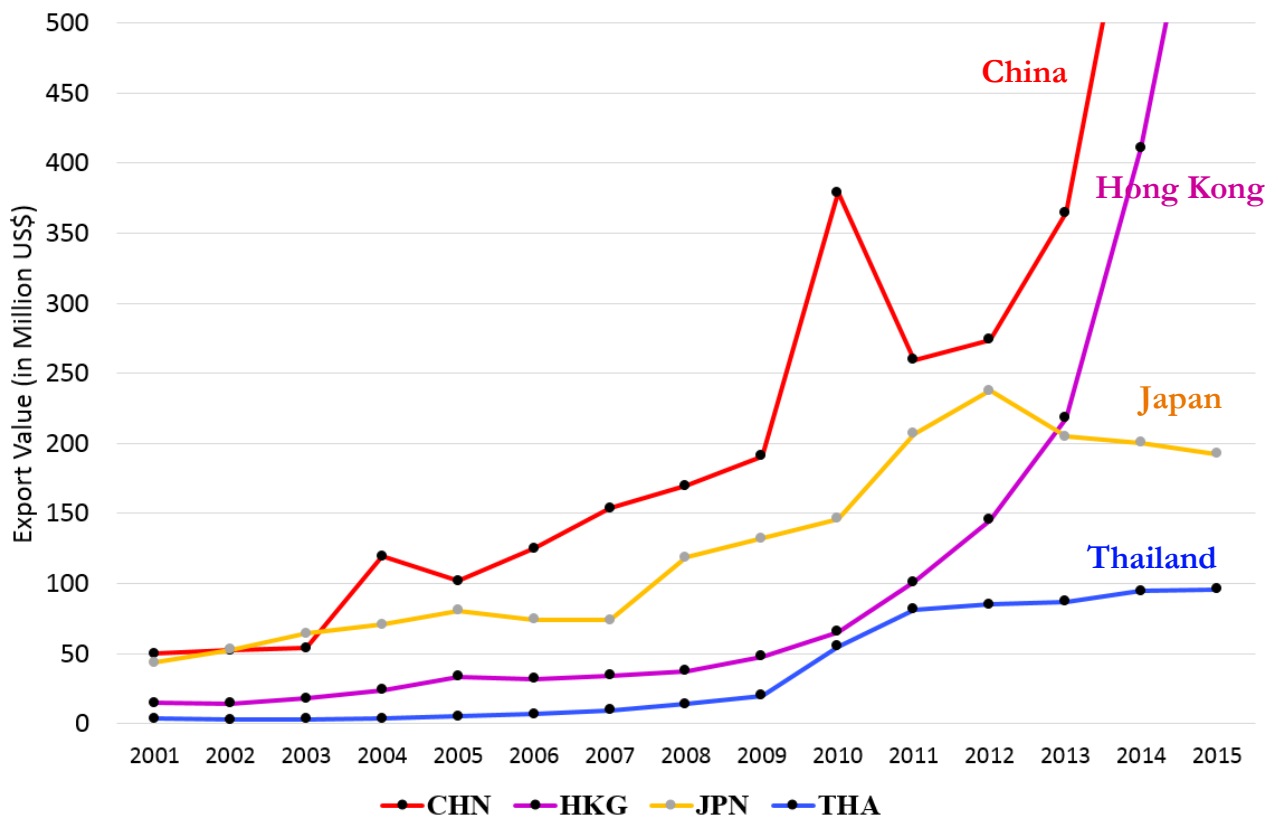
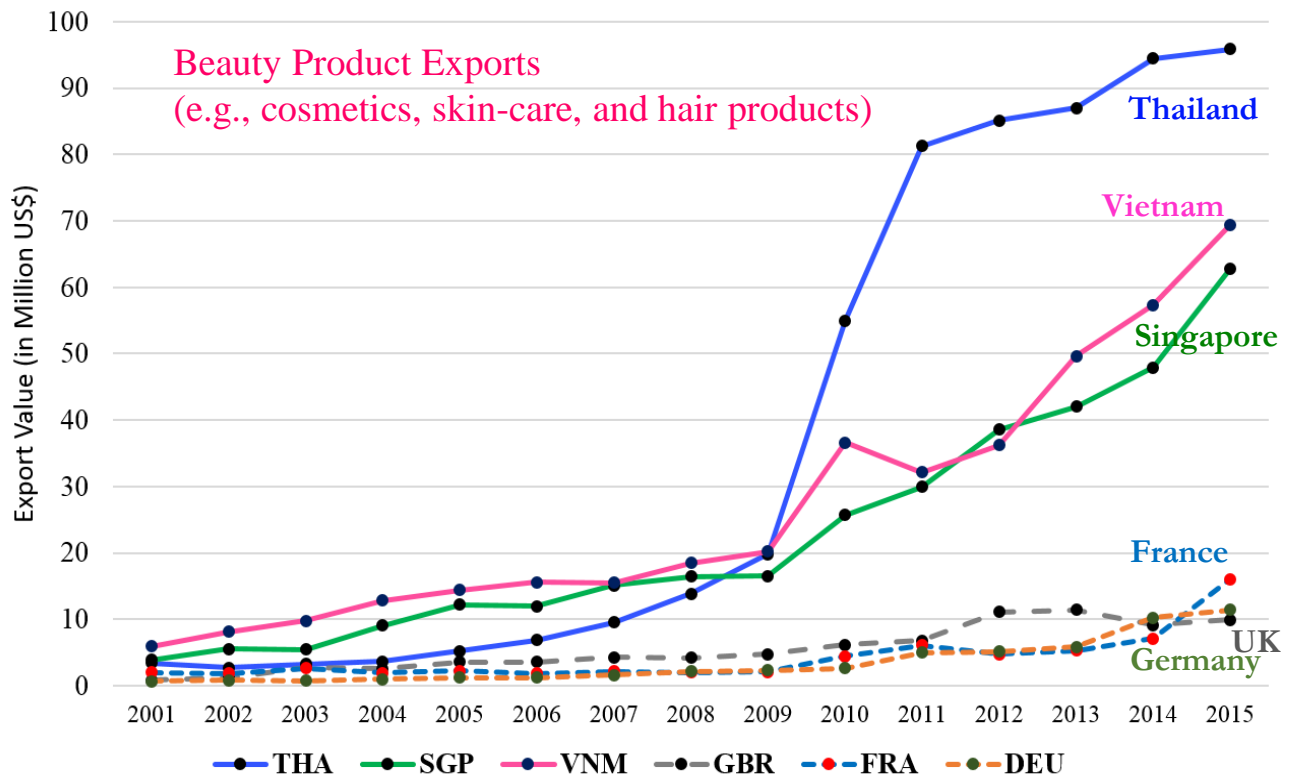


Figure 5: South Korea—Growth in the Number of Foreign Tourists

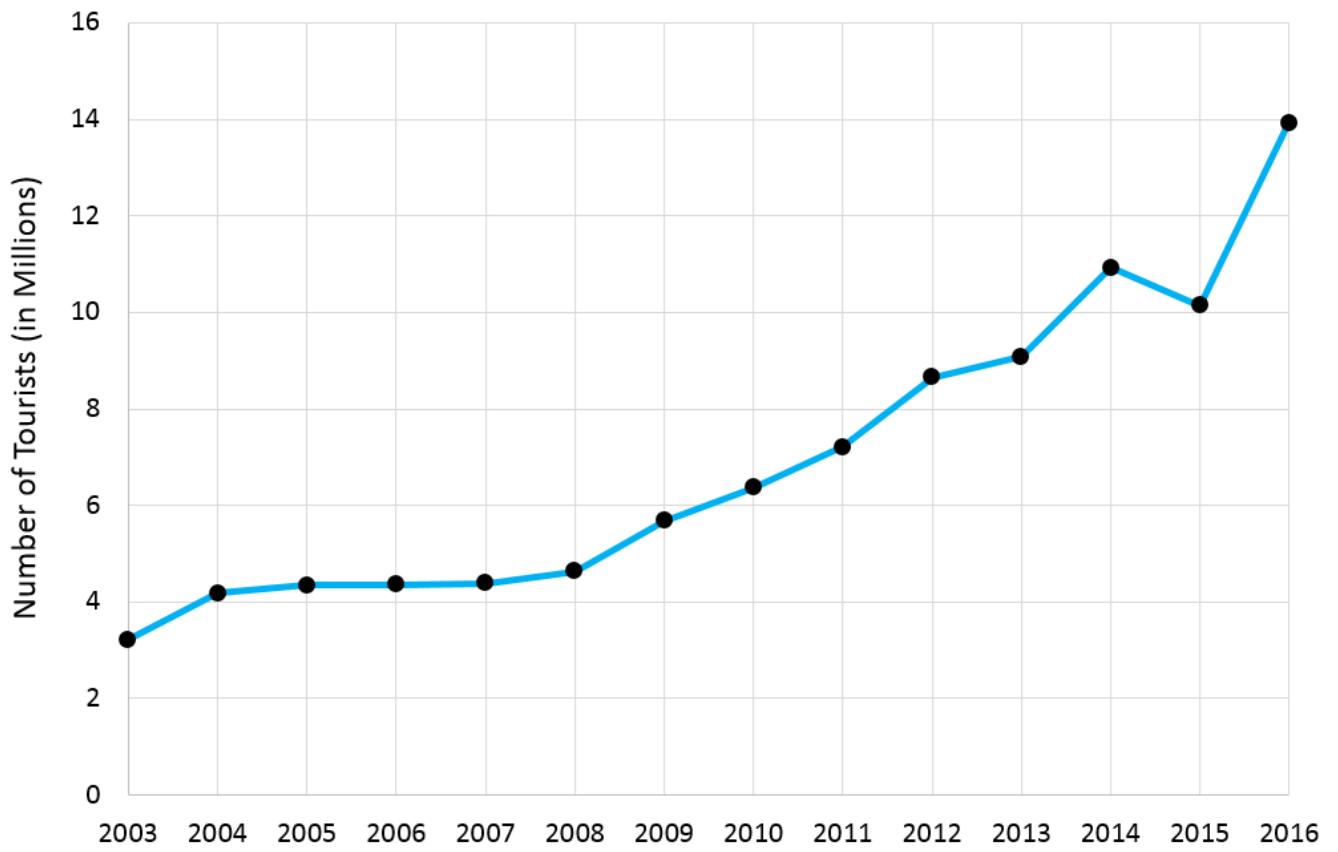


Figure 6: South Korea—Export Trends in Selected BEC Categories

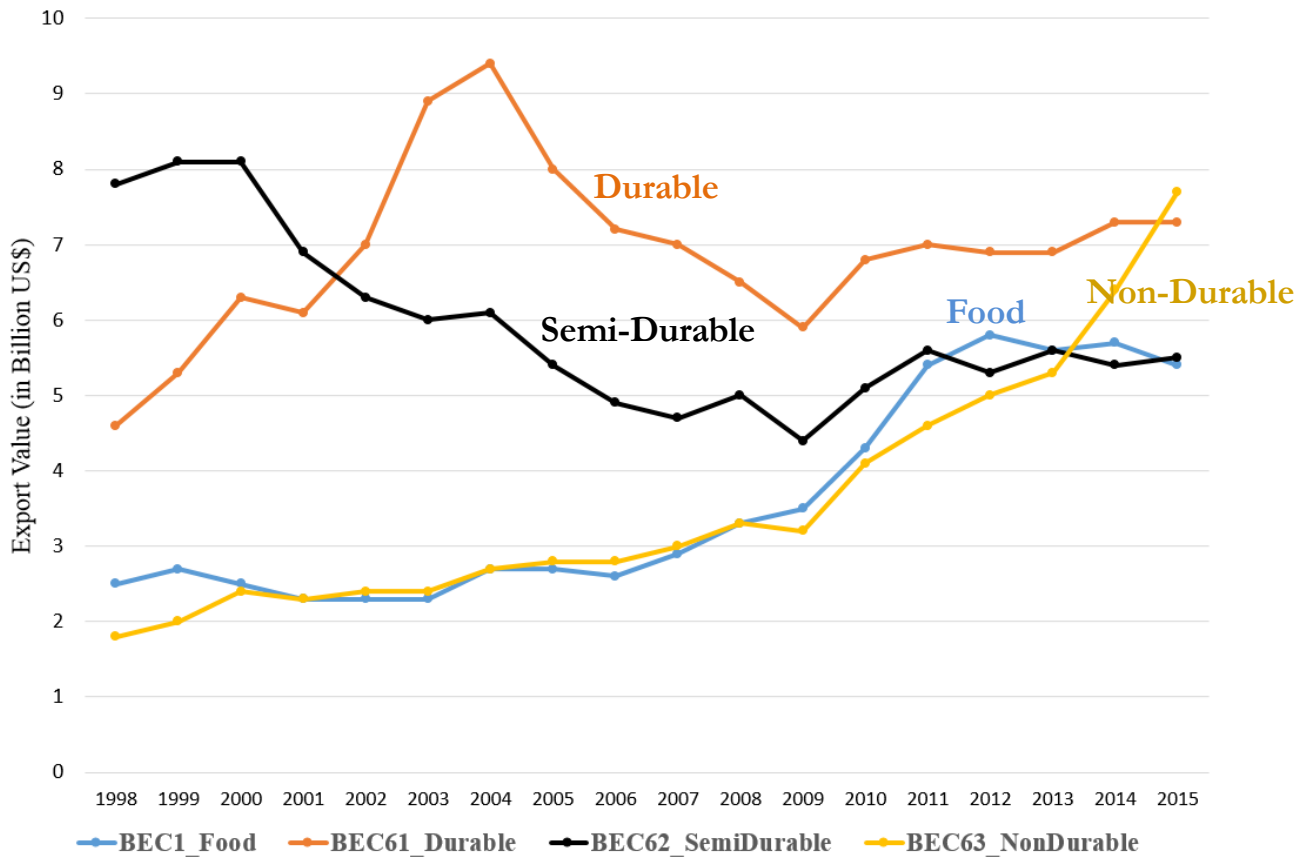
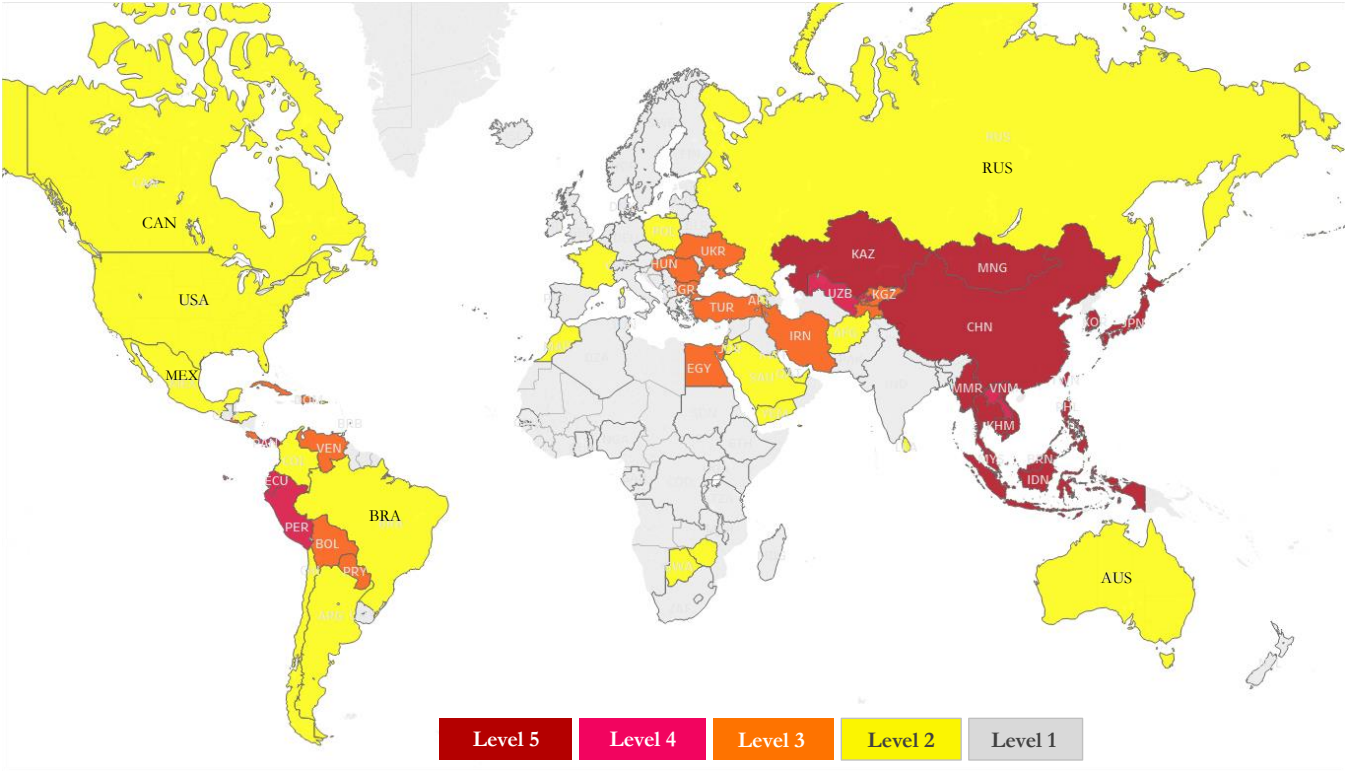


Figure A.1: World Map for Popularity Index of the Korean Wave



Note: Level 5 (Very Popular); Level 4 (Popular); Level 3 (Somewhat Popular); Level 2 (Recognized); Level 1 (Not Interested).