A. Materials for Section II Data

A.1. The Identification of SIC-Manual New Products in Xiang (2005)

Xiang (2005) identifies new products by comparing the product listings of the 1987 SIC manual and the 1972 SIC manual. The SIC manual classifies establishments by type of activity in which they are engaged, and underlies all establishment-based Federal economic statistics classified by industry in the U.S. A main objective of the 1987 SIC-manual-revision is to take into account the technological change and economic growth and decline of individual industries in the U.S. In addition, the 1987 revision also seeks to maintain the continuity of major Federal statistical series based on the SIC classification system, and so changes were unlikely to be made for the sole purpose of obtaining more detailed statistical information on specific products (due to changes in, e.g., the vertical-specialization structure). Examples of new products from Xiang (2005) include "pregnancy test kits", "fiber optic strands", "treadmills", "positron emission tomography (PET) scanner", "cellular radio telephones", and "cable television equipment" … (for more examples see http://www.krannert.purdue.edu/faculty/cxiang/data/ng-name-list.xls). Xiang (2005) shows that the industries with high new-products shares in U.S. domestic output also have high R&D intensities and high shares of investment in computers technology. Therefore, the SIC-manual new products reflect new technology, as opposed to other factors, such as vertical specialization (see the discussions for Table 2 in the text). This matches the purpose of my paper since product cycles are about technology.

A.2. More About the Matching Process

1. I construct the concordance between (4-digit) 87 SIC and (4-digit) 87 mSIC in order to locate the mSIC industries of the SIC-manual new products. For example, the SIC industry 3578 is concorded to the mSIC industry 3578. 2. I classify the TS 7 or HS 10 products into new and old by matching their descriptions to the names of the SIC-manual new products within the same mSIC industries. For example, industry 3578 has five SIC-manual new products. "Accounting machines, operator paced" matches "Accounting Machines" (HS 8470400000), "automatic teller machines (ATM)" matches "Automatic Teller Machines" (HS 8472901000), "calculating machines, operator paced" matches "Electronic Calculators…" (HS 8470100040-60) and "Electronic Calculating Machines…" (HS 847021-29), "point-of-sale devices" matches "Point-of-Sale Terminal Type Cash Registers" (HS 8470500060), and "funds transfer devices" has no match. I classify the above-mentioned HS 10 products as new and the other HS 10

products of industry 3578 as old. 3. If a TS 7 or HS 10 product matches both SIC-manual new and old products, I classify it as new, find all the SIC-manual products that it matches, and assign only a fraction of its import value to new products, the fraction being the number of matched new SIC-manual products divided by the number of matched new and old SIC-manual products. For example, “Automatic Pilots for Aeronautical or Space Navigation” (HS 90142040) matches “space vehicle guidance systems and equipment” (SIC-manual new product) and “automatic pilots” (SIC-manual old product). It also matches “navigational instruments” (SIC-manual old product). I assign 1/3 of its import value to new products. For another example, I assign half the import value of “Electrical Carbon and Graphite Articles…”, HS 8545904000, to new products because it matches both “fibers, carbon and graphite”, a SIC-manual new product, and “carbon specialties for electrical use”, a SIC-manual old product. 4. The reason that the matching was done manually is because the product descriptions in the U.S.-imports data contain many abbreviations; e.g. “pts o non-psto g t e e a/c” (parts of non-piston gas-turbine engines …), TS 6607165. The U.S. Customs and Border Protection (USCBP) maintains the Customs Rulings Online Search System (CROSS) database, which contains some of the product-classification rulings by the USCBP headquarter and New York office from 1989 to present. For each new SIC-manual product I search the CROSS database for its classification rulings. Out of 823 new SIC-manual products 145 have classification rulings. 5. I check the classification rulings in CROSS against my own matching. My matching is the same as the CROSS rulings for 115 out of 145 cases. For example, ruling NY B84153 classifies point-of-sale devices to HS 8470500060. For the remaining 30 cases I update my own matching using the CROSS rulings.

A.3. More About the U.S.-Manufacturing-Imports Data

In the data product codes change from year to year for many reasons unrelated to new products: a given product description may have different numerical codes in different years (e.g. “dolls nes up to 13 inches” is TS 7372025 for 1978 but TS 7372225 for 1979-1982), and previously unused numerical codes may represent changes in U.S. tariff or quota (e.g. “GRINDERS (SPC PRCLM, JAPAN 100% DTY…EFF 4/17/87)”, TS 9458518). Column 2 of Appendix Table A1 tabulates the TS 7 numerical codes by their years-of-first-use, the first years in which these codes show up in the data. Column 3 tabulates new TS 7 numerical codes, those of whose import value a positive fraction can be assigned to new products. Column 4 calculates the ratio of column 2 to 3, and this ratio is low, ranging from 7.66% to 24%. Therefore, year-to-year changes in product codes are at best a noisy measure for new products.

The mSIC classification system is a close cousin of the SIC classification system for domestic production. The main difference is that in the cases where the SIC system classifies activities by process, the mSIC system does not. See Feenstra et al. (2002) for more details. The U.S. imports data for the period 1972-1977 is noisy for two reasons (Feenstra 1996). First, extensive changes were made to the 1977 data because the raw data stored on tapes contained many mistakes, and the descriptions of the TS 7 categories were not included in the raw 1972-1977 data and had to be added manually. Second, 2141 (9.3%) TS 7 numerical codes have their mSIC industry designations missing, and 2140 of these codes have been dis-continued by 1978. Finally, three reasons argue against carrying out the empirical analyses at the product level. First, the change in product classification in the trade data in 1989 makes it difficult to track individual products throughout the sample period. Second, the U.S. import data is noisy at the level of individual products. The data may contain measurement errors, especially for low-value entries (e.g. Choi, Hummels and Xiang 2009). In addition, Besedes and Prusa (2006) show that the length of time a country exports a product to the U.S. is but one year for over 50% of the observations and less than five years for about 80% of the observations. For example, the import value of lace veils (TS 3720600) from Germany was positive in 1974, dropped to zero in 75, became positive again in 76, and dropped to zero again for the next three years. Finally, the product cycles theory predicts that new products appear in the North first, but not in which Northern country. Likewise, the theory predicts that new products move to the South later, but not to which Southern country.

A.4. Other Issues in Data Construction

The following observations and/or product categories are dropped from the data. 1. The SIC-manual new products that represent service or non-tradable activities and whose counterparts I am unable to find in the trade data, such as "Research and development on aircraft engines and engine parts by the manufacture". 2. The observations that show up in the data before their year-of-first-use or after their year-of-last-use. The year-of-first(last)-use is the first (last) year that a TS7 or HS10 numerical code appears in the data. 3. The product categories with "parts" and/or "accessories" in their descriptions, such as "Parts of Heat Pumps" (TS 6612035 and HS 8415908060) and "Parts and Accessories for Electro-Diagnostic Apparatus" (HS 9018199560). I drop these categories because the parts of a new product may or may not be new products themselves. 4. The product categories specifically for the imports subject to quota or from a single source country, such as “grinders (spc prclm, japan 100% dty,ts 683.2018,eff 4/17/87)” (TS 9458518) and “elec furnacs, heatrs a ovens nes, a pts, canadian artcl apta” (TS 6844100). I drop these categories because such tariffs and quotas affect the North and the South differently and so may exacerbate the measurement errors in the relative exports ratio. 5. The product categories not assigned to any mSIC industry. 6. The 19 mSIC industry codes that end in “ZZ” (e.g. 20ZZ, 22ZZ), which are catch-all categories for the products that cannot be assigned to a real mSIC industry. I drop these industries because they might have especially large within-industry product heterogeneity. 7. The nine mSIC industries with less than 5 years of data.

The following 31 countries have average per-capita GDP above $7000 in 1972-1996: Venezuela, Ireland, Germany East, Spain, Israel, Singapore and Trinidad & Tobago, Saudi Arabia, Italy, The Bahamas, Bahrain, New Zealand, Austria, Hong Kong, United Kingdom, Finland, Iceland, Belgium, Japan, Netherlands, France, Denmark, Germany (West), Norway, Sweden, Australia, Kuwait, Switzerland, Canada, Qatar and United Arab Emirates.

A.5. Additional Correlation Exercises

I calculate the new-products export shares for each of the 9 non-U.S. OECD countries for the same years and the same industries as in Table 2, HIY 1999. The correlation coefficients and p-values are: -0.082 (p = 0.2508, all country x industry), -0.3827 (p = 0.0787, Australia, all industry), 0.4415 (p = 0.0397, Canada), -0.4236 (p = 0.0495, Denmark), 0.1338 (p = 0.5527, France), -0.1091 (p = 0.6290, Germany), 0.1117 (p = 0.6206, Italy), -0.2707 (p = 0.2231, Japan), -0.1050 (p = 0.6418, Netherlands), 0.2220 (p = 0.3207, U.K.). In other words, the correlations are sometimes positive and sometimes negative (most insignificant), and there is no clear pattern. The significant correlations for Canada and Denmark go away when I look within broad sectors. Within the machinery sector (as defined by HIY 1999) the correlation is 0.4565 (p = 0.2167) for Canada and -0.4950 (p = 0.1755) for Denmark; within the other-manufacturing sector it is -0.1032 (p = 0.7626) for Canada and 0.2986 (p = 0.3725) for Denmark.

The correlation between new-products export shares for the South and Zhu (2005)’s measures for low-income countries is -0.176 (p = 0.500), and for Zhu (2005)’s measures for middle-income countries it is 0.106 (p = 0.685).

A.6. Details for Web Search

I use Automation Anywhere Premier (http://www.automationanywhere.com/) to conduct an automated web search of Factiva (http://www.dowjones.com/factiva/index.asp), the Dow Jones database for news and media, for each of the 825 SIC-manual new products by year from 1969 (the first year of Factiva coverage) to 1987. The search is based on the phrases that are similar or identical to the names of the SIC-manual new products. e.g. the search phrase for “boxed beef” is “boxed beef”, and that for “discs, laser: audio prerecorded” is ‘ “laser disc” OR “CD” ’. For each SIC-manual new product each year I record the number of total mentions in Factiva. The search was done during the period 02/22/2013 to 03/03/2013 (since Factiva limits the total number of daily queries). During this period I also explored Google News, but I was unable to get the number of Google mentions by year.

The Factiva mentions data have two salient features. First, for most SIC-manual new products the mention numbers do not trend upwards over time. I regress the Factiva mention number on time for each SIC-manual new product. For 542 out of 825 new products, the coefficients of time have t-statistics below 2. These products have indeterminate peak mention years. Second, the vast majority of the other SIC-manual new products, whose mention numbers show significant upward time trends, have peak mention years in the 1980s. I consider three measures for the peak mention year: 1. the year with the largest percentage increase in mention numbers; 2. the year with the largest level increase; and 3. their simple average. All the peak years in the text and in subsequent discussions are based on 3, the average, but the other two measures produce very similar results. As examples, Figure A1 plots the Factiva mention numbers by year for “boxed beef” (the percentage-increase-based peak year is 1980, the level-increase-based is 1985 and their average 1982.5), and Figure A2 is the similar plot for “discs, laser: audio prerecorded” (all three measures of peak year are 1985). For the SIC-manual new products whose mention numbers trend upwards, the mean peak year is 1984.5 and the 25th percentile is 1983.

An additional issue of the Factiva mentions data is that the web search might be noisy; e.g. the mention numbers might have been different if different search phrases had been used. To deal with this issue (it is beyond the scope of this paper to carefully examine the search returns and search phrases of every new product), and to make the best use of the Factiva mentions data, I analyze peak years at the industry (4-digit mSIC) level. The idea is that peak mention years proxy for the time when new products appear in the U.S. market, and the new products within the same industry ought to have similar peak years given that innovations within an industry are likely to be highly correlated. Suppose that for industry k, most new products have peak years in the 1980s. Then the other new products in k are likely to appear in the U.S. market in the 1980s as well, even though they have indeterminate peak mention years.

To implement this idea I aggregate the peak-year values to the industry level. For the SIC-manual new products with indeterminate peak years I assign 1972 as their peak year. I then determine the peak-year values of the new trade products in the U.S. imports data using the mappings from the SIC-manual new products into the trade products. Next I calculate the simple average peak year for the new trade products by 4-digit mSIC industry; e.g. if a mSIC industry has 4 new trade products and 3 have the peak year of 1984 and 1 has 1972, then the industry average peak year is 1981. Across the 243 new-products industries the mean industry peak year is 1976.5, the median is 1972.25 and the 75th percentile 1981.8. I define the industries with peak years after 1979.5 as late-vintage industries and the analyses compare the late-vintage industries with the other industries in the trade data. Appendix Table A4 lists, by 2-digit industry-groups, the average trade values during 1972-2001 for the late-vintage industries and the other industries.

I have also performed the following exercises. First, one may want to focus on a subset of SIC-manual new products and spend more time refining the web searches for this subset. I explore the most frequently used words in the names of the SIC-manual new products. Unfortunately these words are either uninformative (e.g. "machine" and "equipment") or highly concentrated in specific industries (e.g. "computer" for industry 357). Second, I ran a similar web search using an alternative database, ProQuest ABI/INFORM Global (magazine, newspaper, other sources, reports, trade journals and wire feeds), for the SIC-manual new products in the 2-digit groups 28 (chemicals), 35 (machinery), 36 (electronics), 37 (transportation) and 38 (instruments). These five industry groups have the highest ratios of private R&D expenditures to net sales (using federal-plus-private R&D expenditures produces similar results) among manufacturing industry groups (Xiang 2005). The search was done during 03/06/2013-03/18/2013 (ProQuest also limits the number of daily queries). The Factiva mention numbers and the ProQuest mention numbers have a correlation coefficient of 0.937. Finally, I did the estimation in Table 4 for the sample 1972-2001 and obtained similar results.

B. Materials for Section III Framework

For industry *k*, consumers obtain the sub-utility

$$u_k = [\sum_j (\beta_k x_{jk})^{\frac{\sigma_k - 1}{\sigma_k}} + \sum_j (\beta_k^* x_{jk}^*)^{\frac{\sigma_k - 1}{\sigma_k}}]^{\frac{\sigma_k}{\sigma_k - 1}}, \tag{A1}$$

where j indexes varieties and "*" denotes Southern variables. β_k and β_k^* are taste parameters for Northern and Southern varieties, x_{jk} and x_{jk}^* are quantities of consumption for variety j, and $\sigma_k > 1$ is the substitution elasticity. Note that in (A1) the consumer may attach a higher value to one unit of Northern variety than one unit of Southern variety if $\beta_k > \beta_k^*$. The difference between (A1) and a vertical-differentiation framework is that β_k and β_k^* are exogenous.

For the remainder of Period 1, the North and South develop their own varieties for each of the O_k new products, and I model these developments as distinct diffusion processes (e.g. Trajtenberg and Yitzhaki 1989). Let $t \in [0,1]$ be the time within Period 1 that has lapsed since the beginning of period 1, and let m_{ntk} and m_{ntk}^* represent the measures of new varieties that have diffused to the North and South by time t. The diffusion processes are,

$$\ln m_{ntk} = F(t) \ln O_k, \ \ln m_{ntk}^* = F^*(t) \ln O_k, \tag{A2}$$

where $F(t)$ and $F^*(t)$ are cumulative distribution functions (cdf's) over the interval [0,1]. To incorporate the product-cycle hypothesis I assume that $F^*(t)$ first-order-statistically-dominates $F(t)$. Figure A3 uses a numerical example to illustrate the implication of this assumption for m_{ntk} / m_{ntk}^*, where $F(t) = 1 - e^{-t/0.15}$ and $F^*(t) = 1 - e^{-t/0.3}$. Initially, new products diffuse to the North faster and m_{ntk} grows faster than m_{ntk}^*. $\ln(m_{ntk} / m_{ntk}^*)$ decreases. However, as the North approaches developing all O_k new products, there will be a time, T, when m_{ntk} starts to grow more slowly than m_{ntk}^* and $\ln(m_{ntk} / m_{ntk}^*)$ starts to increase. In other words, the product-cycle hypothesis implies that $\ln(m_{ntk} / m_{ntk}^*)$

Equation (A2) generalizes the implicit diffusion processes in Krugman (1979) and other stylized theoretical models for product cycles. In Krugman (1979), the North produces all O_k new products immediately after they become technologically feasible (i.e. at $t = 0$) but the South does not produce any for a period of time (say, for $t \leq t_1 < 1$). This corresponds to $F(t) = 1$ for $t \in [0,1]$ and $F^*(t) = 0$ for $t \in [0, t_1]$ in equation (2). Another example is Grossman and Helpman (1991), in which the South imitates the North's new product varieties, and the South's clones displace the North's new product varieties upon successful imitation. This displacement implies that the increase of m_{ntk}^* causes m_{ntk} to decrease, and it is folded into the diffusion processes $F(t)$ and $F^*(t)$ in the context of (A2). The purpose of the generalization is to give product cycles a better chance with data.

The North's and the South's old product varieties, on the other hand, are imperfect substitutes for their new product varieties in the sub-utility function (A1). This implies that the measures of Northern and Southern old products, m_{otk} and m_{otk}^*, remain unchanged within Period 1. Therefore, $\ln\frac{m_{ntk}/m_{ntk}^*}{m_{otk}/m_{otk}^*}$ changes in the same way over time as $\ln(m_{ntk}/m_{ntk}^*)$, tracing out a U-shape. The assumption that m_{otk} and m_{otk}^* remain unchanged can be relaxed in two ways. First, product varieties may switch to the South as the North acquires new product varietiess (e.g. Krugman 1979). This implies that as the measure of the North's old product varieties, m_{otk}, decreases, the measure of the South's old product varieties, m_{otk}^*, increases. This effect tends to reduce the relative exports ratio, δ_{notk}, and reinforce the North's diffusion process for new products, and the Product Cycle Hypothesis still holds. Next, the South may imitate the North's old product varieties as well, and upon successful imitation, the South's clones also displace the North's old product varieties (e.g. Grossman and Helpman, 1991). This has the same implication about the changes of m_{otk} and m_{otk}^* as discussed above and the Product Cycle Hypothesis still holds.

Let E_{tk} and P_{tk} denote the U.S. expenditure and CES price index for industry k in year t. Let p_{ntk} and p_{ntk}^* denote the delivery prices, inclusive of variable trade costs, of the North's and the South's new product varieties in the U.S. Then the values of the North's and the South's new products exports to the U.S. are,

$$G_{ntk} = \beta_{ntk}\frac{m_{ntk}p_{ntk}^{1-\sigma_k}}{(P_{tk})^{1-\sigma_k}}E_{tk}\,,\ G_{ntk}^* = \beta_{ntk}^*\frac{m_{ntk}^*(p_{ntk}^*)^{1-\sigma_k}}{(P_{tk})^{1-\sigma_k}}E_{tk}\,. \tag{A3}$$

Equation (A3) implies that

$$\ln\frac{G_{ntk}^*}{G_{ntk}} = \ln\frac{m_{ntk}^*}{m_{ntk}} + (1-\sigma_k)\ln\frac{p_{ntk}^*}{p_{ntk}} + \ln\frac{\beta_{ntk}^*}{\beta_{ntk}}\,. \tag{A4}$$

The North-South differencing in equation (A4) sweeps out the U.S. expenditure, E_{tk}, and the U.S. CES price index, P_{tk}, both of which are hard to accurately measure in the data. Analogous to equation (A4), $\ln\frac{G_{otk}^*}{G_{otk}} = \ln\frac{m_{otk}^*}{m_{otk}} + (1-\sigma_k)\ln\frac{p_{otk}^*}{p_{otk}} + \ln\frac{\beta_{otk}^*}{\beta_{otk}}$. Therefore,

$$\ln(\frac{G_{ntk}^*}{G_{otk}^*}/\frac{G_{ntk}}{G_{otk}}) = \ln(\frac{m_{ntk}^*}{m_{otk}^*}/\frac{m_{ntk}}{m_{otk}}) + (1-\sigma_k)\ln(\frac{p_{ntk}^*}{p_{otk}^*}/\frac{p_{ntk}}{p_{otk}}) + \ln(\frac{\beta_{ntk}^*}{\beta_{otk}^*}/\frac{\beta_{ntk}}{\beta_{otk}})\,. \tag{A5}$$

On the left-hand side of equation (A5) is relative-exports ratio. As compared with equation (A4), equation (A5) involves the additional differencing between new and old products within the same dis-aggregated industries. This second differencing controls for the non-product-cycle factors as long as these factors have symmetric impacts on new and old products within the same industries. For example, if the South grows faster than the North, or if the fixed trade costs between the U.S. and the South fall faster than those between the U.S. and the North, both $\ln\frac{G^*_{ntk}}{G_{ntk}}$ and $\ln\frac{G^*_{otk}}{G_{otk}}$ increase. In this case, economic growth and changes in fixed trade costs contaminate equation (A4); but they do not contaminate equation (A5) if the relative-exports ratio remains unchanged.

To control for the delivery prices in (A5) I decompose them as

$$p_{xtk} = c_{xtk}\, e_{tk}\, b_{xtk}\, \tau_{xtk},\ p_{xtk}^* = c_{xtk}^*\, e_{tk}^*\, b_{xtk}^*\, \tau_{xtk}^*,\ x = n, o. \qquad \text{(A6)}$$

The c's are the North's and the South's marginal production costs of new and old product varieties, the e's are exchange rates, the b's are markups, and the τ's are variable trade costs. Because it is difficult to estimate or measure consumer tastes, marginal costs and markups at the product level in the data, I assume that $\ln(\frac{z^*_{ntk}}{z^*_{otk}} / \frac{z_{ntk}}{z_{otk}})$ is a constant, where $z = \beta$, b and c. For this assumption not to hold, consumer tastes, marginal costs and markups must be different between new and old products within the same industries; and this difference between new and old products must be different between the North and the South; and this difference-in-difference must also change over time. This assumption implies that,

$$(1-\sigma_k)\ln(\frac{p^*_{ntk}}{p^*_{otk}} / \frac{p_{ntk}}{p_{otk}}) + \ln(\frac{\beta^*_{ntk}}{\beta^*_{otk}} / \frac{\beta_{ntk}}{\beta_{otk}}) = (1-\sigma_k)\ln(\frac{\tau^*_{ntk}}{\tau^*_{otk}} / \frac{\tau_{ntk}}{\tau_{otk}}) + g, \qquad \text{(A7)}$$

where g is a constant. Plug (A7) into (A5), replace $\ln(\frac{m^*_{ntk}}{m^*_{otk}} / \frac{m_{ntk}}{m_{otk}})$ with the expressions for time, and one gets equations (1) and (2) in the text.

C. Materials for Section IV Results

Appendix Table A2 reports the results of single-difference estimation, where the dependent variables are the new-products and old-products export ratios, $\ln(\frac{G^*_{ntk}}{G_{ntk}})$ and $\ln(\frac{G^*_{otk}}{G_{otk}})$, respectively, and the regressors are the same as in regression (1) in the text. Columns 1-2 are for the new-products export ratio. The coefficient estimate for t is positive (and significant) and the estimate for t^2 is negative (and insignificant), in contrast to the predictions of the product-cycles hypothesis. This suggests that the single-difference estimation fails to produce evidence for product cycles. Columns 3-4 are for the old-products export ratio, and results are similar to columns 1-2. This suggests that non-product-cycle forces drive both the new-products and old-products export ratios, consistent with Figures 3a-3b in the text.

When I estimate regression (1) using individual Northern- or Southern-countries fixed effects, many observations have zero trade flows, especially for new-products trade. For the data with individual Northern countries, out of 170,325 observations, 94,659 have zero trade flows for new products for Northern countries and 98,212 have zero trade flows for either new or old products for either Northern countries or the aggregate South. For the data with individual Southern countries, out of 214,016 observations, 142,543 have zero trade flows for new products for Southern countries and 147,818 have zero trade flows for new or old products for either Southern countries or the aggregate North. Due to the large fractions of zero trade flows in the data I do not estimate (1) using both individual Northern- and Southern-countries fixed effects.

The following countries have export-to-GDP ratio higher than 50% for at least one year during 1978-2001: Hong Kong, Singapore, Belgium, Hungary, Ireland, Malaysia, and Malta.

Appendix Table A3 reports additional robustness exercises for regression (1). Columns 1-2 address the measurement errors that might arise in matching the SIC-manual new products to the imports-data. First, about 20% of the TS 7 numerical codes identified as new products have 1972 as their year-of-first-use (the corresponding percentage is 31% for the TS 7 codes identified as old products), and one may be concerned that some of them are old products mis-classified as new. To address this concern I calculate, for each industry k, the fraction of TS 7 numerical codes that are identified as new and have 1972 as their year-of-first-use among the total number of TS 7 codes. The 90th percentile of the distribution of this fraction is 0.14. I drop all the industries above this cut-off, re-run regression (1), and report the results in column 1. They are very similar to Table 3 of the text. I also experimented with dropping all the industries above the 80th percentile (0.04) and again obtained similar results. Next, some industries have very few new products or very few old products in some years. Measurement errors may have especially large impacts on the relative exports ratio for these observations. To address this concern I calculate the ratio of old products exports to new products exports, $\ln(\frac{S_{otk}+N_{otk}}{S_{ntk}+N_{ntk}})$, by industry by year and examine the distribution of this ratio. I then drop the observations above the 99^{th} percentile of this distribution, 2.95, and those below the 1^{st} percentile, -1.47, and re-run regression (1). The results are in column 2 and they are very similar to Table 3 of the text.

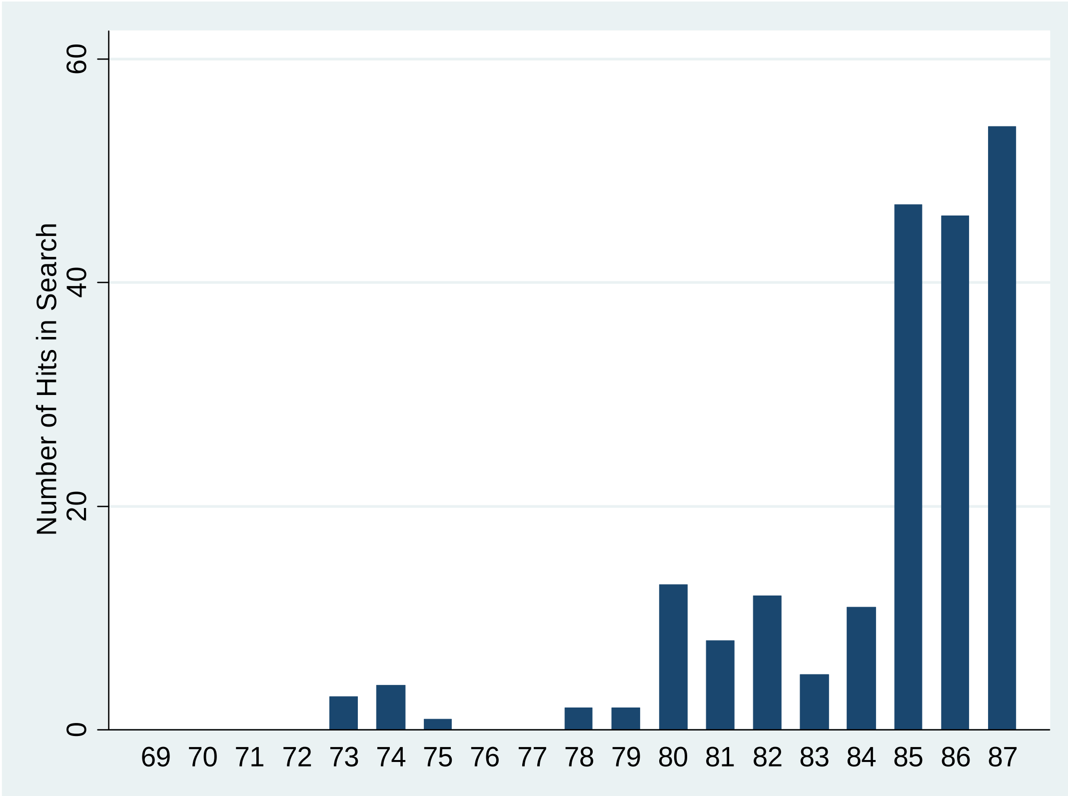
Some TS 7 and HS 10 categories represent military products and so their imports are likely to be heavily regulated (e.g. "self-propelled guns, howitzers, and mortars…"). Such military products are especially concentrated in the industries 3484, 3489 and 3795. I drop these industries and all the other military products in the data, re-run regression (1), and report the results in column 3 of Appendix Table A3. They are very similar to Table 3 of the text. For column 4, I drop the six oil producing countries from the set of Northern countries, Venezuela, Saudi Arabia, Bahrain, Kuwait, Qatar and United Arab Emirates. For column 5, I use the average per capita GDP of $10000 instead of $7000 as the cutoff for Northern countries. This reduces the number of Northern countries to 24, re-classifying Venezuela, Ireland, Germany East, Spain, Israel, Singapore and Trinidad & Tobago as Southern countries. Again the results are similar to Table 3 in the text. Finally, column 6 uses the level $\frac{G^*_{ntk}}{G^*_{otk}}/\frac{G_{ntk}}{G_{otk}}$, rather than relative-exports ratio, $\ln(\frac{G^*_{ntk}}{G^*_{otk}}/\frac{G_{ntk}}{G_{otk}})$, as the dependent variable. This specification preserves the observations where new products are exported by the North only (i.e. $N_{ntk} > 0$ but $S_{ntk} = 0$). Overall, the results are similar to Table 3 in the text, but the R^2 is lower and the coefficient for time square is marginally significant.

Choi, Yo Chul, David Hummels and Chong Xiang, 2009. "Explaining Import Quality: the Role of the Income Distribution", Journal of International Economics 77(2), 265-275.

Feenstra, R.C. 1996. "U.S. Imports, 1972-1994, with State Exports and Other U.S. Data." *NBER working paper No. 5515*.

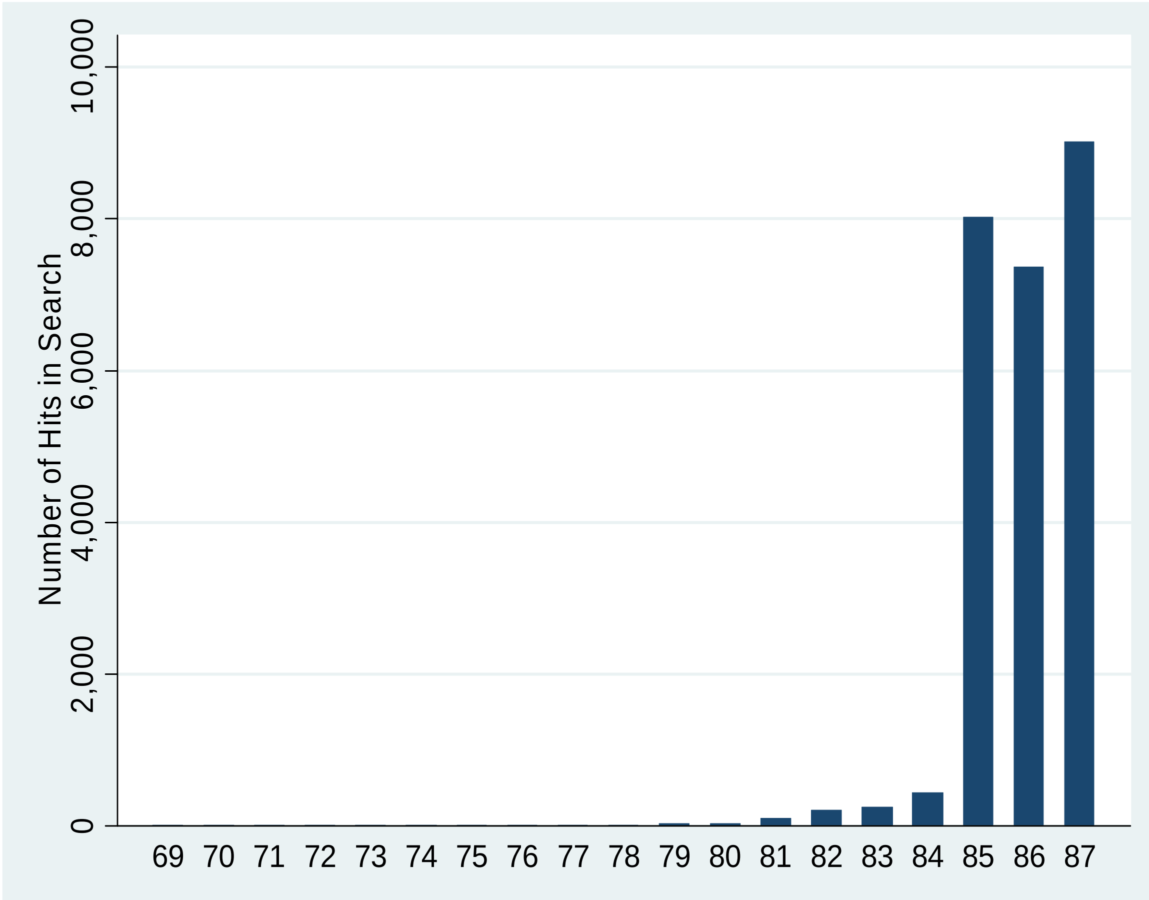
Trajtenberg, Manuel and Shlomo Yitzhaki, 1989. "The Diffusion of Innovations: A Methodological Reappraisal", Journal of Business and Economic Statistics, vol. 7(1), 35-47.

Appendix Figure A1 Factiva Mention Numbers for "Boxed Beef"



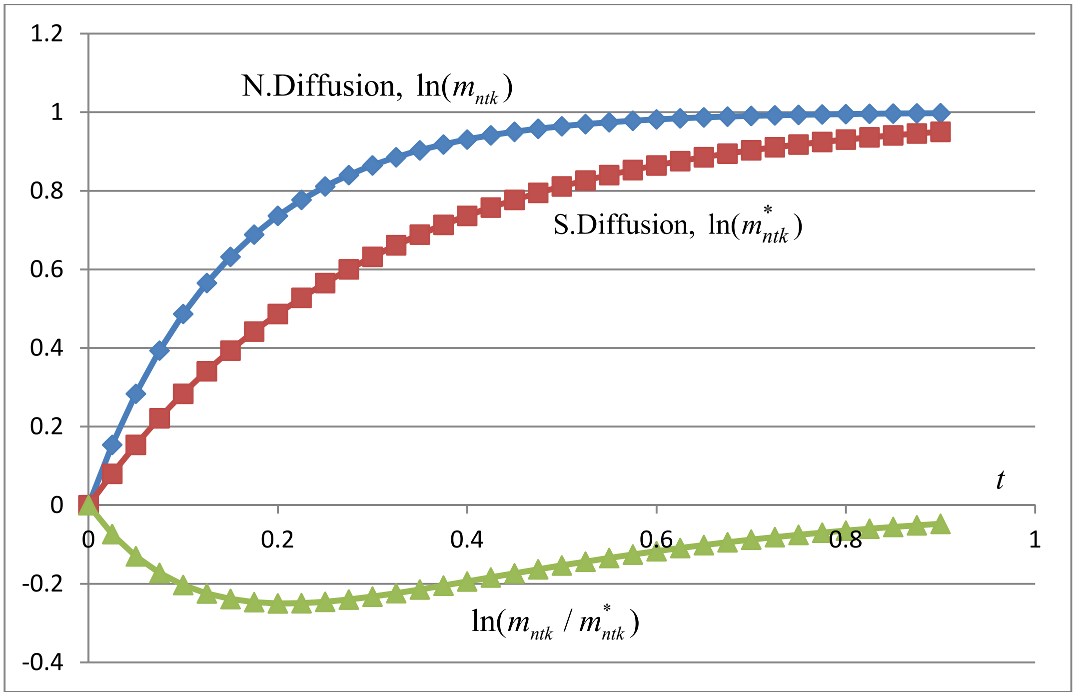
Notes: The mention numbers in 69-72, and 76-77, are 0.

Appendix Figure A2 Factiva Mention Numbers for "Discs, Laser: Audio Prerecorded"



Notes: The mention numbers in 69-80 are all positive. Since they are small they may not show up clearly in the figure above.

Appendix Figure A3 A Numerical Example for the Product-Cycle Hypothesis



Appendix Table A1 Tabulation of Year-of-First-Use for TS 7 Numerical Codes

Year-of-first-use (1)	All TS 7 Codes, Frequency (2)	New TS 7 Codes, Frequency (3)	% of New TS 7 Codes (4) = (3)/(2)
1972	6897	561	8.13%
1973	481	47	9.77%
1974	399	42	10.53%
1975	485	48	9.90%
1976	517	66	12.77%
1977	548	42	7.66%
1978	2459	381	15.49%
1979	272	27	9.93%
1980	1601	250	15.62%
1981	287	51	17.77%
1982	1110	219	19.73%
1983	229	55	24.02%
1984	566	110	19.43%
1985	5713	683	11.96%
1986	972	186	19.14%
1987	305	46	15.08%
1988	186	25	13.44%
Total	23027	2839	12.33%

Notes: New TS 7 codes are those of whose import value a positive fraction can be assigned to new products.

Appendix Table A2 Single-Difference Estimation

Regressors	(1) New-Prod. Exp. Ratio	(2) New-Prod. Exp. Ratio	(3) Old-Prod. Exp. Ratio	(4) Old-Prod. Exp. Ratio
t	0.188***	0.115***	0.143***	0.118***
	(0.0410)	(0.0182)	(0.0167)	(0.0146)
t^2	-0.00189	0.000182	-0.00237***	-0.00140**
	(0.00118)	(0.000623)	(0.000622)	(0.000544)
$\ln(\frac{\tau^*_{ntk}}{\tau_{ntk}})$		-0.967***		
		(0.220)		
$\ln(\frac{\tau^*_{otk}}{\tau_{otk}})$				-0.633***
				(0.129)
Constant	-3.295***	-2.527***	-2.631***	-2.360***
	(0.355)	(0.135)	(0.0904)	(0.0845)
Obs. No.	4,461	4,432	5,203	5,187
R^2	0.651	0.763	0.849	0.869

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are in the brackets and they are clustered by year. Industry fixed effects are included. The industry-k-year-t observations are weighted by the average value of new-products and old-products exports for industry k over 1978-2001. The dependent variable is $\ln(\frac{G^*_{ntk}}{G_{ntk}})$ for columns 1-2, and $\ln(\frac{G^*_{otk}}{G_{otk}})$ for columns 3-4.

Appendix Table A3 Robustness Exercises

Regressors	(1) Drop 1972 New Prod.	(2) Drop Ind. With Few New or Old Prod.	(3) Drop Military Prod. & Ind.	(4) \$10,000 N-S Cutoff	(5) Drop Oil Producing Countries	(6) Level Reg.
t	-0.315***	-0.295***	-0.300***	-0.293***	-0.305***	-4.832**
	(0.0344)	(0.0326)	(0.0327)	(0.0293)	(0.0335)	(2.2390)
t^2	0.00933***	0.00867***	0.00887***	0.00827***	0.00919***	0.125*
	(0.0013)	(0.0012)	(0.0013)	(0.0011)	(0.0013)	(0.0707)
$\ln(\frac{\tau^*_{ntk}}{\tau^*_{otk}} / \frac{\tau_{ntk}}{\tau_{otk}})$	-0.866***	-0.851***	-0.864***	-0.770***	-0.882***	
	(0.196)	(0.218)	(0.194)	(0.177)	(0.187)	
T	16.903***	17.026***	16.880***	17.728***	16.592***	50.31***
	(0.762)	(0.721)	(0.755)	(0.686)	(0.745)	(17.590)
Constant	2.030***	1.728***	1.892***	1.922***	1.903***	19.404***
	(0.203)	(0.195)	(0.191)	(0.181)	(0.191)	(3.450)
Obs. No.	3,593	4,248	4,334	4,415	4,392	5,074
R^2	0.478	0.445	0.477	0.464	0.48	0.201

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are in the brackets and they are clustered by year. Industry fixed effects are included. The industry-k-year-t observations are weighted by the average value of imports for industry k over 1978-2001. The dependent variable is $\ln(\frac{G^*_{ntk}}{G^*_{otk}} / \frac{G_{ntk}}{G_{otk}})$, except for column 6, where it is $\frac{G^*_{ntk}}{G^*_{otk}} / \frac{G_{ntk}}{G_{otk}}$.

Appendix Table A4 Average Trade Values of Late-Vintage Industries

Industry Group	Late-Vintage Industries	Other Industries
20 (food)	1.03E+07	8.71E+06
21 (tobacco)	0	0
22 (textile)	1.56E+07	9.65E+06
23 (apparel)	2.96E+07	1.03E+08
24 (wood)	2.85E+05	6.87E+07
25 (furniture)	7.07E+06	5.62E+07
26 (paper)	1.47E+07	3.35E+07
27 (printing)	1.94E+07	2.36E+07
28 (chemicals)	1.74E+06	4.51E+07
29 (petroleum)	0	2.56E+07
30 (rubber/plastics)	0	2.73E+08
31 (leather)	1.08E+08	0
32 (clay/glass)	3.15E+06	1.19E+07
33 (metal: primary)	6.20E+07	1.27E+06
34 (metal: fabricated)	8.59E+05	2.94E+07
35 (machinery)	2.07E+08	7.67E+08
36 (electronics)	7.88E+08	7.56E+07
37 (transportation)	5.78E+06	1.53E+07
38 (instruments)	4.54E+07	1.45E+08
39 (miscellaneous)	2.01E+08	7.14E+07

Notes: The units are dollars and the industries are 4-digit mSIC. "Other Industries" are the new-products industries whose average peak-year values are smaller than 1979.5.