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International Consumption Patterns among High-income Countries: Evidence from the OECD data [*]

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Abstract

The paper analyzes product-level consumption patterns among countries in the OECD in the period from 1985 to 1999. Estimation results find robust evidence of strong convergence in cross-country consumption patterns. The paper also finds a relationship between openness and the cross-country consumption pattern.

Globalization; OECD; convergence; half life;
JEL: C33; D12; F02

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Abstract

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1   Introduction

The international integration of markets for goods and services has characterized the modern world economy. This process - commonly known as "globalization" - has integrated not just trade and capital markets, but also consumer markets. The emergence of a global consumer market has "brought rapid changes in consumption patterns, from toothpaste to refrigerators, and led to the spread of global 'brand-name' goods." (United Nations Development Programme (UNDP), 1998, p.46). Indeed, global merchandise imports more than doubled to $ 5 trillion in the period from 1980 to 1995, as world household consumption expenditure grew at an unprecedented pace to reach

$20 trillion in 2000.[1] The globalization of consumer markets has not only propelled considerable advances in human development (UNDP, 1998), but also raised concerns that market integration makes consumption behavior increasingly similar across countries.

This paper investigates whether the advance of globalization indeed makes consumption patterns converge across countries. The hypothesis of convergence of world consumption patterns is accredited to Theodore Levitt. More than twenty years ago in Levitt (1983), he argued that firms should sell standardized consumer products, because "the world's preference structure is relentlessly homogenized:"

> Different cultural preferences, national tastes and standards, and business institutions are vestiges of the past. Some inheritances die gradually; others prosper and expand into mainstream global preferences. So-called ethnic markets are a good example. Chinese food, pita bread, country and western music, pizza, and jazz are everywhere. They are market segments that exist in worldwide proportions. They don't deny or contradict global homogenization but confirm it (96-97).

Levitt's view has received a new look in the recent globalization debate. In particular, those who oppose globalization argue that the integration of consumer market spreads "global consumption standards" (UNDP, 1998; 65), presumably promoted by multinational corporations, and that such market integration stifles local variation and drives out traditional practices (Wolf, 2004, provides a broader perspective for this view). While criticisms of globalization often reflect a view of the world that economists generally do not share, it is important to note that Levitt's view remains anecdotal to this date, long into the advance of globalization. This is, according to our best knowledge, the first paper to provide systematic evidence pertaining to international consumption patterns.[2]

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[1] The import figure is from UNDP (1998, p.46), and the world expenditure figure is from the World Watch Institute (http://www.worldwatch.org/press/news/2004/01/07/).

[2] Gracia and Albisu (2001) list several factors that promote homogenization of food

The UNDP study (1998) documents that most of the benefits from market integration fall onto high-income developed countries. Indeed the countries in the Organization for Economic Co-operation and Development (OECD) accounted for more than 70% of global consumption expenditure, and world inequalities in consumption patterns and levels are substantial. One fifth of the world's people in the highest-income countries consume 86% of total expenditure, while the share of the bottom fifth in the poorer countries is less than 10%. Hence the effect of globalization on cross-country consumption patterns, if present, should be most pronounced in rich countries. We thus restrict our research focus to high-income countries, the OECD countries and their subgroups, to seek for clear evidence of convergence in consumption patterns. To anticipate the paper's results, we find evidence of strong convergence in consumption patterns.

We use expenditure data of major household consumption items in the high-income countries over the past two decades, and investigate how the cross-country consumption patterns changed over time. Globalization would homogenize international consumption patterns at least for two reasons: One is homogenization in the composition of consumption baskets around the world. As Thomas Friedman (2000) puts it, "In the world of globalization, you won't be able to leave home. [...] [g]lobalization is creating a single market place – with huge economies of scale that reward doing the same business or selling the same product all over the world all at once [...] Everywhere will start to look like everywhere else, with the same Taco Bells, KFC's, and Marriotts" (p278-9). The other reason is that consumer preference structure is being homogenized simultaneously across countries. Levitt (1983) introduced above represents this view. Our data set does not allow us to identify the most relevant cause of cross-country convergence in consumption patterns. Instead, we concentrate our efforts on establishing the evidence concerning cross-country consumption patterns, leaving the identification issue to future research.

The reminder of the paper is organized as follows. The next section

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consumption patterns across European Union countries, and argue for the homogenization but with no statistical evidence.

presents important statistics from cross-sectional and time-series dimensions of our data set. Section 3 takes advantage of the panel feature of the data, and estimates various specifications of convergence in cross-country consumption pattern. Estimation results presented in the same section fins that the cross-country consumption pattern is not a random walk, but converges with short half lives. This finding is robust to either the benchmark choice, data selection, and inclusion of other control variables. Section 4 concludes, followed by a data appendix.

2 A Preliminary Look at Consumption Patterns

This section describes the data set used in our analysis of international consumption patterns, and provides preliminary evidence from the data. A detailed description of data construction can be found in the appendix. Our data source is *Purchasing Power Parities and Real Expenditures* published by the OECD in the years 1985 (22), 1990 (24), 1993 (24), 1996 (32) and 1999 (43).[3] The number of member countries covered in the data is indicated in parenthesis for each year. To utilize the full sample period, we focus our attention on the 22 countries for which data are available throughout the years. In the subsequent analyses, we also use more restricted samples: countries in the European Union (as of 1999; hereafter EU), and the G-7 countries (i.e., Canada, France, Germany, Italy, Japan, U.K., and U.S).

The OECD collects the data for the purpose of international comparisons of GDP from the expenditure side. Final expenditure on GDP is broken down into a group of similar well-defined products. We focus on household final consumption expenditure, being decomposed into eight broad categories: food, beverages and tobacco; clothing and footwear; gross rents, fuel and power; household equipment and operation; medical and health care; transport and communication; education, recreation and culture; and miscellaneous goods and services. The OECD carefully chooses commodity baskets to make product comparisons reasonable across the countries and across the different study periods. This paper uses two data series from the source: real

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[3] The 1999 data are the latest available at the time of writing.

final expenditure on GDP at international prices as a percentage of GDP (in current US dollars); and relative price levels of final expenditure on GDP at international prices, setting the average over the products and countries equal to one. We calculate the product expenditure share by country from the first series. Both data are measured per-head. To obtain a preliminary idea about the features of our three-dimensional panel data (in which the three dimensions are by product, by country, and by time), we present summary statistics in Table 1 and Figure 1. The table highlights cross-sectional features of the data, while the figure illustrates time-series features.

Table 1 tabulates real income, [4] product-level final expenditure shares, and the corresponding prices for each OECD country, averaged over the sample period from 1985 to 1999. The table also indicates the member countries of the EU and the G-7. The following three observations emerge from the table. The first two concern the correlation between variables, while the third concerns the variance of the variables:

(O1) Real income and expenditure share

The category "Food, Beverage, and Tobacco" has a strong negative correlation coefficient of -0.8, and "Medical and Health Care" has a positive coefficient of 0.6. These correlation results agree with our common sense that the Engel coefficient of food declines with income and that the population is aging in high-income society. The degree of the correlation for the other products falls between these values, indicating that country real income has some explanatory power in product expenditure shares.

(O2) Real expenditure and price

The correlation coefficients between real expenditure and price at the product level are found to be all negative, ranging from -0.61 (Gross rent, fuel and power) to -0.77 (Miscellaneous goods and services).

(O3) Dispersions in price and expenditure share

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[4] The country real income is adjusted by the Stone price index. We discuss the index in Section 3.2.

> Price and expenditure shares vary across countries. The stan-
> dard errors of the two variables are on average one quarter of the
> mean values. Most volatile are "Transport and Communications"
> and "Household equipment and Operation," whereas "Medical and
> Health Care" is the least volatile. At the country level, average
> prices are high in the Scandinavian countries and Japan, and low
> in Turkey.

The cross-country price dispersion observed in (O3) indicates the existence
of market segmentation.[5] When markets are segmented, prices for the same
product can differ, because of differences in costs across countries, differences
in price elasticities of demand, or differences in market power. Market seg-
mentation rests on various barriers: tariffs and quotas; information available
to consumers; social barriers that limit people's freedom to consume, and so
forth. The price differences also cause the differences in expenditure share
across countries. Although Table 1 indicates that markets are segmented
by country during the study period, we would still expect that the integra-
tion process in consumer markets diminish the degree of the existing market
segmentation. We discuss time-series evidence of the data shortly in Figure
1.

The correlation observed in (O2) is reasonable: consumers spend more
(less) on products that are cheaper (more expensive). This observation, along
with the finding in (O1) shows that income and prices are important deter-
minants in the subsequent analysis of consumption patterns. Of course we
can think of other variables presumably playing a role in the determination
of consumption patterns. For example, socio-demographic characteristics,
such as age composition in the population, and the proportion of working
women, would influence food consumption: Older consumers tend to reduce
the energy values of their diet, and working women rely more on ready-to-eat
meals. Although our data do not contain such national demographic vari-
ables, we take advantage of the panel feature of our data set, and control for
the effect of such unobserved variables by including the product and country

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[5] As we explained above, the OECD carefully chose commodity baskets to make prod-
ucts comparison reasonable across countries and across publication years.

fixed effects in the estimation. To anticipate the result discussed in Section 3, we find that these fixed effects have little significance with our data set.

In the statistical analyses in Section 3, we primarily focus on product expenditure shares. While we could use product real expenditure as an alternative variable, we find that the expenditure level is vulnerable to general price changes (deflation in particular in our context) experienced in most OECD countries in our study period. Real expenditure is thus not suitable for use with the convergence study in this paper, because the variable would not be stationary.

Figure 1 shows time-series evidence on expenditure shares (on the left-hand side) and prices. The figure illustrates the dispersion of the two variables over the study period. Each graph includes three standard errors calculated by the data pooled by the OECD, EU and G-7 countries. The right-hand side of Figure 1 shows a declining trend of price dispersion. The standard errors decreased by a third over the 15 years among EU countries, making the average rate of decline 10 percent (5.2 % for OECD and 6.1 % for G-7). Although a sizable dispersion still remains by the end of the sample, this observation is consistent with our conjecture that the degree of market segmentation diminishes with the progress of globalization.

Product expenditure shares show a declining trend with a bump in 1993. This is the year when the Maastricht Treaty came into force, leading to the creation of the EU. The creation of a common single market appears to have accelerated the rate of convergence (5% for the EU), compared with 2.3% during the period from 1985 to 1990. The bump in 1993 may have been temporary, due to the transition to the single market in Europe. In short, the summary statistics in Figure 1 on the whole indicate the cross-country convergence in consumption patterns. We now turn in the next section to a statistical analysis to confirm this finding.

3 Convergence in Cross-Country Consumption Patterns

In this section, we conduct a systematic analysis of the homogenization of international consumption patterns. We use the data of cross-country product-

level expenditure shares described in the previous section. Although we use data pertaining to prices and income as control variables in the following analyses, this paper does not focus on the convergence of these two variables. This is because our data have no particular advantage over those used in the literature of cross-country convergence in price and income (surveyed in, for example, Ben-David, 1996 and Taylor, 2001). Instead we focus on the convergence of cross-country consumption patterns, a topic which is novel in the literature.

The rest of this section is organized as follows: In Section 3.1, we estimate various versions of the convergence equation with respect to product expenditure share. We discuss the choice of benchmark measure and the choice of data used in the estimation. In Section 3.2, we include further control variables discussed in the previous section. Section 3.3 estimates the convergence equation with each country pair separately, while Section 3.4 further relates our estimation results with aspects of globalization.

3.1   Basic Framework

This section proceeds in two steps. We first test the unit root hypothesis. If we reject the null hypothesis of random walk, we discuss the rate of convergence in cross-country consumption patterns. Our basic specification is:

$$\Delta w_{i,j,t} = \beta w_{i,j,t-1} + \gamma \Delta w_{i,j,t-1} + \epsilon_{i,k,t} \tag{1}$$

Let $w_{i,j,t}$ be the log-difference in the expenditure share of product $j \in \{1, ..., 8\}$ in country i relative to the benchmark at year t. Note that t takes on any of the OECD data publication years; 1985, 1990, 1993, 1996, and 1999. We denote Δ the first-difference operator, namely $\Delta w_{i,j,t} \equiv w_{i,j,t} - w_{i,j,t-1}$. We discuss the benchmark choice in the next paragraph. As we do with a standard augmented Dickey-Fuller test, we should include lags of $\Delta w_{i,j}$ to account for possible serial correlation in the error, $\epsilon_{i,k,t}$. Due to the short time-series dimension of our data, we are just able to include a period of lag as in eq(1).

Theory helps us little in choosing the choice of the benchmark in $\Delta w_{i,j,t}$.

In practice, however, some studies report that the choice does affect estimation results (for example, Parsley and Wei, 1996). We are thus careful in the benchmark choice by taking three different approaches. The first approach is to set one particular country as the benchmark; the second approach is to choose a theoretical cross-country average as the benchmark; and the final one is to focus on country pairs, and estimate eq(1) for each pair separately. We discuss the first two approaches in this section, and leave the country-pair approach to Section 3.3.

In the first approach, we choose the U.K as the benchmark country. The choice of the U.K. is due to the fact that the country is a member of the OECD, the EU and the G-7. Since we test eq(1) with the sample of each country group separately, the benchmark country is preferably in the intersection of the groups. The other such candidates are France, Germany, and Italy. Our estimation results with the UK reported in this section are robust to the choice of one of the other three countries as the benchmark (results with the other benchmark countries are available from the authors upon request). To further check the robustness of this result, we perform the second approach. We use as a benchmark a theoretical cross-country average. Since we use three country groups, the cross-country average differs by the choice of the group.

In principle, we could include the product and country fixed effects in eq(1). Levin and Lin (1992) report the empirical distribution of the unit root t-statistic for the convergence equation with the individual fixed effects and serial correlation in the error structure. The results with the fixed effect (not reported in this paper) indicate that the F-test cannot reject the hypothesis that all the fixed effects coefficients are zero, and that the convergence rate is estimated unreasonably high (i.e., the unit root test is rejected and the estimated value of β is very low in negative). Since the fixed effect specification does not give us useful insight with our data, we use eq(1) as the base model. Finally eq(1) assumes a common β across products and across countries. In the following analyses, we relax this assumption by estimating the model by product. We also estimate eq(1) by each pair of countries, assigning a different β for each pair, in Section 3.3.

Results of panel unit root tests are summarized under (A) of Table 2. We discuss results (B) in the next section. The upper block of the table shows results when the benchmark country is the UK, and the bottom shows estimates when the benchmark is a cross-country average. For each benchmark case, we analyze three sets of countries; the OECD, EU, and G-7. All the estimates of β reject the unit root at the 1 percent level, and thus we conclude that cross-country expenditure share is a stationary process.

Conditional on our finding that the $w_{i,j,t}$ process is not a unit root, the magnitude of a negative β indicates the rate of convergence in $w_{i,j,t}$. Table 2 indicates that the coefficients of β are estimated at a similar level, ranging from -0.35 to -0.24. Using the estimate, we calculate the half-life index, $\log{(0.5)}/\left(\widehat{\beta}\right)$, where $\widehat{\beta}$ is the estimate of β. The half-life index informs the number of periods it takes to eliminate 50 percent of the impact of a shock in $w_{i,j,t}$. Note that we define a unit of period as the data publication frequency, varying from 3 to 5 years. Table 2 shows that implied half-life index is on average 1.04 periods, or approximately 4.2 years. It is difficult for us to assess the magnitude of our half-life index, because this paper is the first to create the index in the context of cross-country expenditure shares. However, many studies have estimated half-life indices on international price convergence. This literature has traditionally found the index ranging from five to seven years. Although price and expenditure shares are very different variables, our obtained half-life index is roughly equivalent to this finding in the price convergence literature.

It is interesting to note that the convergence rate is the fastest in the EU, followed by the OECD and the G-7. The implied half-life index in the EU is half a year shorter than that of the OECD and more than a year shorter than that of the G-7. The finding is consistent with the view that the EU has moved quickly integrating the consumer market with the removal of both tariff and non-tariff cross-border trade barriers within the union.

3.2   The role of price and income

Section 2 suggests that both income and product prices appear to be important determinants of cross-country product-level expenditure shares. In this section, we extend the base model (1) and incorporate the income and price variables in the estimation. We estimate the following version of convergence equation for product j at country i at time t:

$$\Delta w_{i,j,t} = \beta w_{i,j,t-1} + \gamma \Delta w_{i,j,t-1} + \sum_{k=1}^{8} \delta_{j,k} p_{i,k,t} + \eta_j m_{i,t} + \epsilon_{i,k,t} \qquad (2)$$

Let $p_{i,j,t}$ be the log-difference in the price of product j in country i relative to the benchmark at year t, and $m_{i,t}$ be the log-difference in country i's normalized real income relative to the benchmark. The third and fourth terms in eq(2) are added to the right-hand side of eq(1). Several underlying assumptions are worth commenting on. The third term in eq(2) allows for substitution effects, and the fourth term for income effect. We assume that both effects are contained within a country, and do not spill across the national border. Country i's real income is normalized in that the real income is divided by the aggregate Stone price index: namely the expenditure-share-weighted sum of the log prices of all products in country i at year t. This transformation warrants stationarity of the variable. Note that the price variables are already normalized, as discussed in Section 2.

The results for the model (2) are reported under (B) in Table 2. The estimates of β reject a unit root of $w_{i,j,t}$ for all the six cases listed in the table, and indicate strong convergence. Indeed the magnitudes of the absolute values of β in (B) ranges from 40 to 150 percent larger than those found in (A). The implied half-life indices under (B) are on average 0.59 periods, or 2.4 years. While this convergence rate in (B) is faster than that found in (A) without controls for price and income, it is not outside the range of estimates in the price convergence literature. For example, Goldberg and Verboven (2001) find in their recent study of European Auto prices that the implied half-life is 1.3 years, shorter than our finding in this subsection.

3.3   Relaxing the Assumption on the Common Convergence Coefficient

We have so far shown that the cross-country expenditure shares are stationary, and the convergence rates are on average in the range from 2.4 years (with the controls of price and income) to 4.2 years (without the controls). One of the maintained assumptions in eqs (1) and (2) is that the convergence rate is common across products and across countries. In this section, we relax this assumption of the common convergence coefficient, first in the dimension of product, and then in the dimension of country.

To allow for β by product, we perform the regressions by each product separately. The estimation results are reported in Table 3. We use the specification in which the benchmark country is the UK. Using the theoretical cross-country average as the benchmark does not alter our discussion here. The results from eq(1) are under (A) and those from eq(2) are under (B). All the estimates of β in Table 3 reject the unit root. The estimates under (A) are in the narrow range from -0.34 to -0.21, and those under (B) are in the range from -0.77 to -0.17. The product, "Food, beverage and Tobacco" attains the most rapid convergence rate for both cases, whereas the product with the slowest convergence differs between (A) and (B). Indeed as we noted in the introduction, food and beverage is a staple example, with which Friedman (1999) and Levitt (1983) describe the homogenization of cross-country consumption pattern. The estimation results in Table 3 show that, though varying in degree, cross-country convergence is observed in all products in our data, and thus that our convergence results in Table 2 are not an artifact of the assumption of the common β imposed on all products in the model.

We now turn to the analysis of different convergence coefficients by country. We create a pair of countries, and estimate eq(1) for each pair independently. At the same time, this method serves as the third approach in the choice of benchmark, discussed in Section 3.1. Due to the small number of observations for each pair, we could not include the price and income controls in the estimation. To conserve space, we tabulate estimated convergence parameters for the EU in Table 4. The estimates for the other pairs are available

upon request. Table 4 shows that for most of the country pairs, the estimates of β, are significantly different from both zero and one.[6] Although the pairs with Austria (AT for short) have somewhat lower estimates, the convergence coefficients are estimated on average as -0.35 with the half-life index being about 3.1 years. Tables 3 and 4 demonstrate that the convergence is observed at the disaggregated levels of product and cross-country pair, and we conclude that our finding of international convergence in expenditure shares are robust to the assumption about the common convergence coefficient.

3.4   Implications of Globalization

In the previous sections, we established the evidence that cross-country consumption patterns converge over time. This finding is robust to either the benchmark choice, data selection, or the choice of model specification. This evidence shows only a trend underneath the changes in the international expenditure share within the OECD countries. A time trend, however, does not necessarily capture the effect of globalization, because the influence of globalization must fall onto countries to different degrees given the presence of various tariff and non-tariff barriers specific to a particular country. In this subsection, we look for the relationship between globalization and our finding of the international convergence in consumption patterns.

As we stated in the introduction, this paper has concentrated on fact-finding regarding cross-country consumption patterns, and does not examine identification issues. Keeping to the purpose of the paper, we seek to find a correlation between globalization and international consumption patterns, not a causation between them. Identifying the cause-and-effect relationship is not an easy task, because presumably the causality can go either way: on one hand, as the market integrates globally, and the content of consumption baskets becomes similar with international trade, consumption patterns may homogenize among countries. On the other hand, other conditions being constant, as the pattern of consumption is being homogenized, countries

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[6] The mean values of two pairs in the table, (DE, AT) and (NE, GE), are outside the interval between -1 and 0. However, we cannot reject the hypothesis that the β-estimates of the two pairs is inside the interval.

may trade more with each other, since they are able to specialize in production, based on the principle of comparative advantage. [7] While to establish causality is an interesting project, we leave this topic to future research.

To find evidence of the correlation, we need to create a proxy for the degree of globalization progress. We examine international transaction of goods and services, and use total trade (namely the sum of imports and exports) as a percentage of GDP for the proxy of the globalization progress. This variable, often named as the openness variable, is a commonly used measure in the trade literature. The variable is taken from the *Penn World Table 6.1*.

We analyze how the openness variable correlates with cross-country consumption patterns. Since the product-level consumption pattern may differ by country, we calculate a standard error in the product-level expenditure share for each country and for each year of the data publication. The standard error is calculated as the deviation from the mean of product expenditure shares pooled in the OECD countries by country and by year. We find that the correlation coefficient between the openness variable and the standard error is -0.19, indicating that the consumption pattern of a country with more trade is closer to the consumption pattern of the theoretical OECD average. Our finding of the negative correlation remains, even after we control for country and product fixed effects. The estimated coefficients of the openness variable in the regression of the standard error in the expenditure share indicates that a one-percent increase in openness decreases the standard deviation of the relative consumption share by one percent. [8]

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[7] While differences in preferences may also be a source of international trade, it is likely that any initial differentials in preferences are caused by different endowments in autarky. For example, the historical French and English preference for wine and beer probably reflected availability. As globalization intensifies and consumption patterns become more similar, international trade increases as countries can take advantage of their relative production strengths.

[8] An alternative approach to study the effect of openness on consumption patterns would be to focus on country pairs, and examine the effect of bilateral trade on the bilateral differences in expenditure shares. The problem with this approach is that it ignores the effect of trade with third parties. Think about the following hypothetical situation as an example. Suppose that two particular countries trade little with each other, but each country trades much with a third country. Under the assumption that trade influences expenditure shares of a country, the consumption pattern of the two countries under

The above result of the negative correlation does not imply a relationship between the rate of convergence and the openness variable. To obtain an insight regarding that relationship, we add to eq(1) the interaction term of $w_{i,j,t-1}$ and the openness variable. The estimate of the coefficient of the interaction term is found neither statistically nor economically significant (the estimate is -0.001 with the standard error 0.0008, when the mean of the interaction term is 0 and its standard deviation is 2.9). This estimated coefficient indicates that the rate of convergence is not related to the openness variable, and thus we cannot reject the hypothesis that the speed of the convergence in expenditure share is the same across the OECD countries. The finding of the uniform convergence in the cross-country expenditure share is perhaps reasonable in that the openness variable used in the paper only captures one channel of the progress of globalization. Foreign direct investment, immigration and tourism, and telecommunications are other forces that have been pushing the advance of globalization. While the data that reflect all these forces of globalization are not currently available for all the OECD countries, it would be an appealing research topic to analyze how each of the globalization channels influences the cross-country consumption pattern.

4   Conclusion

The international integration of markets and the advance of communication technology have been changing consumption patterns in developed countries. Computers, microchips and the internet have been transforming lives in developed countries as well as in developing countries. Now it is easy to obtain information as to what people in other countries eat, drink, and wear. Internet retailing makes it easier for us to purchase goods and services from outside the country. Thus the advance of communication technology has fa-

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study may well be influenced by trade with the third country, despite trade being limited between them. In this hypothetical situation, we would mistakenly conclude that the openness variable is not responsible for changes in expenditure shares in the analysis of bilateral country relationship. An obvious example is trade with the United States. If this trade influences consumption patterns in countries, they may increasingly resemble each other without much bilateral trade between them.

cilitated trade in goods, enlarged trade in services, and moved capital flows to a higher level. The purpose of the paper has been to examine whether we observe such effects of globalization in consumption data.

This paper offered the first study to make an international comparison of consumption behavior among the twenty-two OECD countries. It used quantities and prices of eight broadly defined household-consumption goods for each country, the data which are used in OECD studies of purchasing power parity. The paper examined cross-country consumption patterns in the period between 1985 and 1999, and found that the expenditure shares indeed converged across the industrialized countries. This convergence result is robust to the benchmark choice, data selection, inclusion of the price and income variables, and model specifications. This paper concentrated its focus on finding evidence on cross-country consumption patterns, and did not investigate the mechanism whereby the observed consumption patterns are generated. A future research project is to tackle such a question. An interesting project is to investigate the extent to which the homogenizing international consumption patterns are due to changes in the available consumption basket brought by trade and communication technologies. Case studies on a particular commodity would be a useful way to approach the problem.

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A   Data Description

The data used for the demand estimation is from the OECD study called *Purchasing Power Parities and Real Expenditures.* We used all available publications from the first edition of 1985 to the latest edition of 1999. This study has been published to provide internationally comparable price and volume measures of GDP, and to construct appropriate measures of real income and expenditures covering all the OECD Member Countries. Our data set includes 22 countries (Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, New Zealand, Norway, Portugal, Spain, Sweden, The Netherlands, Turkey, United Kingdom and the United States) to make the comparison possible across the years from the 1985 to the 1999 editions.

The paper used two series of the data; real final expenditure on GDP at international prices as a percentage of GDP; and relative price levels of final expenditure on GDP at international prices, with the average over the products and countries equal to one. Both data are per-head measure. [9] When a price is not reported, we calculated it as the ratio of real and nominal expenditures. We converted the expenditure data into per-head measure when the measure is not available. Population data used for the conversion are from the IMF's *International Financial Annual* database (October, 2003).

The paper used eight household expenditure categories, listed in Section 2.[10] To focus directly on the household consumption pattern, we did not use government consumption and capital formation, under the assumption that government spending is exogenous to household decisions on expendi-

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[9] The paper used the following tables: Tables 2.7 and 2.16 for 1985, Tables 2.4 and 2.14 for 1990 and 1993, and Tables A1 and A2 for 1996 and 1999.

[10] Changes in the System of National Account made in 1993 did not affect the classification of the eight product categories listed in Section 2. They only affect the sub-classification within each of the eight categories.

ture allocation, and that the saving and consumption decisions are made separably. While it is plausible that household consumption substitutes with government spending and household saving, the assumption claims that this concern affects only the level of household expenditure, not the expenditure share of each product category.

TABLE 1

Cross-sectional Eidence from the OECD data
Average Values over Sample Period from 1985 to 1999

	AU	AT	BE	CA	DE	FI	FR	GE	GR	IR	IT	JP	LU	NE	NZ	NO	PT	SP	SW	TR	UK	US	Correlation Coeff.	
EU	-	Y	Y	-	Y	Y	Y	Y	Y	Y	Y	-	Y	Y	-	-	Y	Y	Y	-	Y	-		
G-7	-	-	-	Y	-	-	Y	Y	-	-	Y	Y	-	-	-	-	-	-	-	-	Y	Y		
Real Income (adjusted by the Stone price index) [1]	12213	11841	12328	13142	11648	9411	12319	13035	8306	8694	12139	11928	17404	11933	10410	10733	7857	9460	10418	3728	11797	17549		
Food, Beverage, and Tabacco																								
Expenditure share [2]	0.18	0.17	0.17	0.15	0.19	0.21	0.18	0.15	0.31	0.26	0.20	0.18	0.19	0.16	0.18	0.23	0.30	0.21	0.19	0.35	0.17	0.12	Corr w/ Income	-0.83
price [3]	0.81	1.00	0.96	0.93	1.28	1.35	1.00	0.97	0.76	1.04	0.91	1.58	0.90	0.90	0.81	1.52	0.72	0.80	1.34	0.51	0.97	0.85	Corr w/ Exp. Shr	-0.64
Clothing and Footware																								
Expenditure share	0.05	0.08	0.07	0.06	0.05	0.05	0.06	0.07	0.09	0.06	0.09	0.06	0.07	0.06	0.05	0.07	0.09	0.08	0.06	0.11	0.06	0.06	Corr w/ Income	-0.48
price	0.92	1.16	1.24	0.93	1.22	1.30	1.23	1.17	1.07	0.93	1.07	1.33	1.29	1.03	0.91	1.27	0.94	1.03	1.18	0.58	0.89	0.80	Corr w/ Exp. Shr	-0.62
Gross Rent, Fuel and Power																								
Expenditure share	0.21	0.23	0.18	0.23	0.25	0.21	0.20	0.20	0.15	0.13	0.16	0.20	0.18	0.19	0.21	0.19	0.10	0.13	0.28	0.21	0.19	0.18	Corr w/ Income	0.17
price	1.00	1.36	1.02	0.96	1.14	1.04	1.07	1.22	0.67	0.73	0.64	1.43	0.97	1.03	0.78	0.97	0.35	0.64	1.15	0.33	0.81	1.00	Corr w/ Exp. Shr	-0.61
Household Equipment and Operation																								
Expenditure share	0.07	0.07	0.09	0.07	0.06	0.06	0.07	0.07	0.07	0.06	0.09	0.05	0.10	0.07	0.07	0.07	0.08	0.06	0.06	0.11	0.06	0.05	Corr w/ Income	-0.20
price	0.96	1.02	1.00	0.88	1.13	1.11	1.05	1.02	0.79	0.95	0.97	1.45	1.04	0.98	0.92	1.12	0.69	0.89	1.10	0.54	0.94	0.87	Corr w/ Exp. Shr	-0.63
Medical and Health Care																								
Expenditure share	0.08	0.05	0.11	0.06	0.03	0.05	0.12	0.14	0.05	0.05	0.07	0.11	0.07	0.12	0.07	0.06	0.05	0.05	0.04	0.03	0.03	0.16	Corr w/ Income	0.59
price	0.80	0.88	0.76	0.78	1.20	1.02	0.80	0.98	0.55	0.83	0.79	0.80	0.85	0.75	0.71	0.99	0.64	0.72	1.13	0.36	0.79	1.62	Corr w/ Exp. Shr	-0.65
Transport and Comunication																								
Expenditure share	0.14	0.15	0.13	0.15	0.15	0.16	0.15	0.15	0.12	0.13	0.12	0.10	0.17	0.12	0.17	0.14	0.16	0.15	0.16	0.08	0.16	0.14	Corr w/ Income	0.40
price	0.90	1.23	1.04	0.90	1.38	1.34	1.10	1.10	0.65	1.20	0.95	1.17	0.90	1.09	0.84	1.49	0.86	0.92	1.25	0.48	1.13	0.97	Corr w/ Exp. Shr	-0.77
Education, Recreation and Culture																								
Expenditure share	0.13	0.09	0.09	0.13	0.12	0.11	0.09	0.10	0.06	0.12	0.10	0.10	0.08	0.11	0.11	0.11	0.08	0.09	0.11	0.05	0.12	0.11	Corr w/ Income	0.40
price	0.87	1.14	1.13	0.85	1.20	1.31	1.13	1.06	0.71	0.78	1.04	1.27	0.94	0.95	0.79	1.32	0.65	0.87	1.28	0.47	0.90	0.92	Corr w/ Exp. Shr	-0.69
Miscellaneous Goods and Services																								
Expenditure share	0.15	0.09	0.15	0.16	0.14	0.15	0.13	0.12	0.15	0.19	0.17	0.20	0.14	0.17	0.14	0.13	0.15	0.23	0.11	0.07	0.21	0.17	Corr w/ Income	0.21
price	0.93	1.14	1.00	0.79	1.37	1.39	1.14	1.06	0.89	1.02	0.94	2.00	0.93	1.00	0.74	1.50	0.63	0.88	1.39	0.49	0.98	0.86	Corr w/ Exp. Shr	-0.77

Notes:

1. Real income is the total nominal expenditure on the eight categories in the current $ US, adjusted by the Stone price index.
2. Price in the table is relative prices, setting the OECD average equal one.
3. Expediture share is by each of the eight product groups.

TABLE 2

Estmation Results of eq (1)

Benchmark	Data set		β	Std Error	Half-life	No. Obs
UK	OECD	(A)	-0.30	0.02	1.00	528
		(B)	-0.53	0.03	0.57	528
	EU	(A)	-0.35	0.03	0.86	360
		(B)	-0.57	0.04	0.53	360
	G-7	(A)	-0.24	0.04	1.24	168
		(B)	-0.63	0.07	0.48	168
Cross-country Average	OECD	(A)	-0.27	0.03	1.11	528
		(B)	-0.44	0.03	0.69	528
	EU	(A)	-0.32	0.03	0.93	360
		(B)	-0.46	0.04	0.65	360
	G-7	(A)	-0.27	0.05	1.13	168
		(B)	-0.48	0.09	0.63	168

All estimates of β are significant at the 99-percent confidence level. Results (B) include control variables of price and income, and Results (A) do not include them.

TABLE 3

Convergence in Expenditure Shares
Estimation Results from eq(2)

		β	Std Err	Half-life
Food, Beverage, and Tabacco	(A)	-0.34	0.06	0.90
	(B)	-0.77	0.10	0.39
Clothing and Footware	(A)	-0.24	0.05	1.24
	(B)	-0.17	0.09	1.78
Gross Rent, Fuel and Power	(A)	-0.30	0.10	0.99
	(B)	-0.49	0.08	0.61
Household Equipment and Operation	(A)	-0.21	0.06	1.41
	(B)	-0.31	0.09	0.98
Medical and Health Care	(A)	-0.21	0.06	1.46
	(B)	-0.37	0.09	0.80
Transport and Comunication	(A)	-0.28	0.06	1.06
	(B)	-0.47	0.08	0.64
Education, Recreation and Culture	(A)	-0.22	0.08	1.39
	(B)	-0.35	0.13	0.86
Miscellaneous Goods and Services	(A)	-0.32	0.06	0.93
	(B)	-0.59	0.10	0.51

The number of Observation: 66

All estimates of β are significant at the 99-percent confidence level. Results (B) include control variables of price and income, and Results (A) do not include them.

TABLE 4

Estimation Results based on Cross-Country Pairs in the EU

	AT	BE	DE	FI	FR	GE	GR	IR	IT	LU	NE	PT	SP	SW	Average
BE	-0.82 [a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.82
DE	-1.15 [a]	-0.32 [a,c]	-	-	-	-	-	-	-	-	-	-	-	-	-0.73
FI	-0.80 [a]	-0.38 [a,c]	-0.62 [a,c]	-	-	-	-	-	-	-	-	-	-	-	-0.60
FR	-0.74 [a]	-0.45 [b,c]	-0.24 [b,c]	-0.33 [b,c]	-	-	-	-	-	-	-	-	-	-	-0.44
GE	-0.70 [a]	-0.42 [b,c]	-0.27 [b,c]	-0.33 [a,c]	-0.39 [b,c]	-	-	-	-	-	-	-	-	-	-0.42
GR	-0.47 [b,d]	-0.34 [a,c]	-0.36 [a,c]	-0.28 [b,c]	-0.34 [a,c]	-0.30 [a,c]	-	-	-	-	-	-	-	-	-0.35
IR	-0.52 [b d]	-0.29 [b,c]	-0.27 [a,c]	-0.28 [b,c]	-0.20 [a,c]	-0.21 [a,c]	-0.47 [a,c]	-	-	-	-	-	-	-	-0.32
IT	-0.67 [b]	-0.37 [c]	-0.28 [b,c]	-0.28 [b,c]	-0.22 [b,c]	-0.27 [b,c]	-0.45 [a,c]	-0.19 [c]	-	-	-	-	-	-	-0.34
LU	-0.82 [a]	-0.42 [b,c]	-0.27 [c]	-0.45 [b,c]	-0.19 [c]	-0.33 [b,c]	-0.43 [a,c]	-0.34 [b,c]	-0.44 [a,c]	-	-	-	-	-	-0.41
NE	-0.74 [a]	-0.49 [b,d]	-0.26 [b,c]	-0.35 [a,c]	-0.07 [c]	0.003 [c]	-0.32 [a,c]	-0.33 [a,c]	-0.31 [b,c]	-0.26 [c]	-	-	-	-	-0.31
PT	-0.33 [c]	-0.18 [b,c]	-0.17 [b,c]	-0.15 [c]	-0.16 [b,c]	-0.17 [b,c]	-0.51	-0.18 [c]	-0.21 [b,c]	-0.30 [b,c]	-0.22 [a,c]	-	-	-	-0.24
SP	-0.44 [b,d]	-0.18 [c]	-0.24 [b,c]	-0.31 [a,c]	-0.17 [a,c]	-0.22 [a,c]	-0.41 [a,c]	-0.45 [a,c]	-0.20 [a,c]	-0.21 [b,c]	-0.27 [a,c]	-0.27 [a,c]	-	-	-0.28
SW	-0.73 [a]	-0.34 [a,c]	-0.49 [b,d]	-0.31 [b,c]	-0.29 [b,c]	-0.31 [b,c]	-0.25 [b,c]	-0.24 [b,c]	-0.28 [b,c]	-0.35 [b,c]	-0.28 [b,c]	-0.14 [c]	-0.30 [a,c]	-	-0.33
UK	-0.79 [a]	-0.32 [a,c]	-0.29 [a,c]	-0.40 [a,c]	-0.21 [b,c]	-0.27 [a,c]	-0.42 [a,c]	-0.42 [a,c]	-0.26 [b,c]	-0.34 [b,c]	-0.37 [a,c]	-0.30 [a,c]	-0.29 [a,c]	-0.30 [c]	-0.36
Average	-0.70	-0.35	-0.31	-0.32	-0.22	-0.23	-0.41	-0.31	-0.28	-0.29	-0.29	-0.23	-0.29	-0.30	-0.35

Note

Subscripts a,b indicate that the estimate is statistically different from zero at the respective 99-, and 95-% confidence levels. Subscripts c,d indicate that the estimate is statistically different from one at the respective 99-, and 95-% confidence level.

FIGURE 1

Standard Errors of Expenditure Shares and Prices
OECD, EU, and G-7