
Mizuho Economic Outlook & Analysis

July 12, 2018

The light and shadow of the e-commerce market

*The expansion of e-commerce is weighing down prices
Boosting the elderly's consumption is the key*

< Summary >

- ◆ Japan's B-to-C e-commerce market is on an expansionary trend. Consumers are shifting to online shopping for travel-related expenses and other items, but elderly people's online expenditure remains low.
- ◆ The expansion of e-commerce is increasing the pressure on price competition, weighing down the prices of goods, including furniture, household products, clothing, and footwear as well as services such as travel-related expenses, while lowering the growth rate of BOJ-style core CPI by 0.1 to 0.2 percentage points since 2017.
- ◆ Further advances in internet use are likely to lower the CPI growth up to 0.1 percentage points. Generating demand especially among the elderly population is the key to connecting e-commerce expansion to economic revitalization.

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1. Arrival of the full-fledged e-commerce age with AI and big data

Many people use the internet for shopping, for example, accessing Amazon to buy books. Perhaps some online shoppers end up buying recommended items based on their purchase history displayed on their Amazon page.

Using big data to analyze the purchase history of individual consumers, businesses are desperately trying to uncover the potential needs of consumers. Advanced technologies such as AI (artificial intelligence) have in fact ushered in a new era of offering goods and services in response to the diverse needs of consumers. It is no exaggeration to say that e-commerce (electronic commerce) has reached a stage where its true value is being tested.

It is true that the growing e-commerce market is beneficial in terms of facilitating comparisons of various products as well as increasing convenience for consumers, but it is not necessarily evident how e-commerce affects consumption and prices in Japan's overall economy. This report explores the effects of e-commerce market growth on the country's economy and the outlook for e-commerce.

2. Current conditions of Japan's e-commerce market and online consumption

According to the Ministry of Economy, Trade and Industry's "FY2017 E-Commerce Market Survey," Japan's B-to-C e-commerce market (e-commerce transaction amount between businesses and consumers) is expanding in size each year, reaching 16.5 trillion yen in 2017 (**Chart 1**). The e-commerce ratio (ratio of e-commerce market size to the total commercial transaction amount) also rose to approximately 6% in 2017. In addition, **Chart 2** shows changes in the ratio of online expenditure to the household consumption expenditure (hereinafter "online expenditure") based on Kawata and Hirano (2018), using the Ministry of Internal Affairs and Communications' "Family Income and Expenditure Survey" and "Survey of Household Economy." Following expansion of the rate of households using the internet for shopping, the ratio of online expenditure has reached roughly 4% so far in 2018 (January to April average).

Next, **Chart 3** indicates the rates of online expenditure and households using the internet for shopping by age. This chart reveals that the older age groups' internet use for shopping is lower than that of the younger age groups. As for the online expenditure rate, people aged 34 and younger stand at approximately 5%, while those aged 65 and older remain at around 1%.

Moreover, **Chart 4** represents the online expenditure rate by major items. The average rates in 2018 (January to April) vary widely for each item, with food (groceries, deliveries, and beverages) standing at roughly 2%; furniture and household products (home appliances, etc.), clothing and footwear, and books at around 10%, respectively;

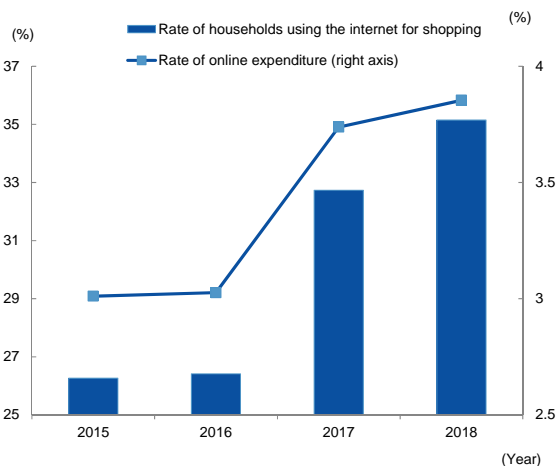
and travel-related expenses (accommodations and package tours) at approximately 60%.¹ These results suggest that purchase decisions on food and books are strongly influenced by looking at actual products, whereas purchase decisions on travel plans can be made based on online information alone.

Chart 1: E-commerce market size and changes in e-commerce ratio (B to C)



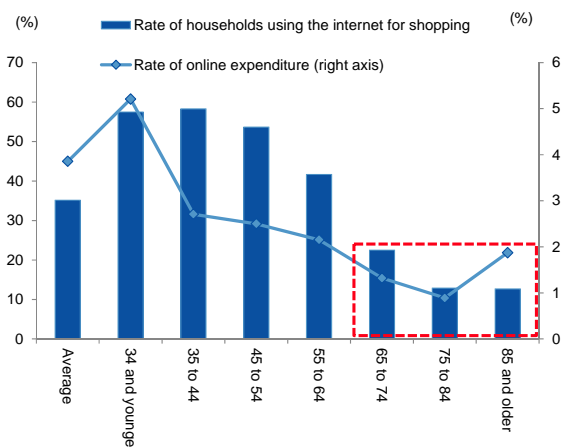
Note: The e-commerce ratio is for product sales.
Source: Made by MHIRI based on the Ministry of Economy, Trade and Industry, *FY2017 E-Commerce Market Survey*.

Chart 2: Changes in online expenditure rate



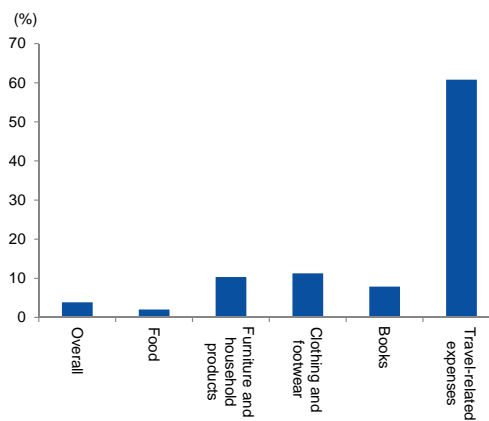
Note: Two-or-more-person households; January to April average in 2018.
Sources: Made by MHIRI based on the Ministry of Internal Affairs and Communications, *Family Income and Expenditure Survey* and *Survey of Household Economy*.

Chart 3: Online expenditure rate (by age)



Note: Two-or-more-person households; January to April average in 2018.
Sources: Made by MHIRI based on the Ministry of Internal Affairs and Communications, *Family Income and Expenditure Survey* and *Survey of Household Economy*.

Chart 4: Online expenditure rate (by item)



Note: Two-or-more-person households; January to April average in 2018.
Sources: Made by MHIRI based on the Ministry of Internal Affairs and Communications, *Family Income and Expenditure Survey* and *Survey of Household Economy*.

¹ Strictly speaking, careful attention to the different categories of items used in the statistics is required.

3. E-commerce expansion likely to dampen the CPI of various goods and services

(1) Previous studies suggest the “Amazon effect” is responsible for lowering CPI growth

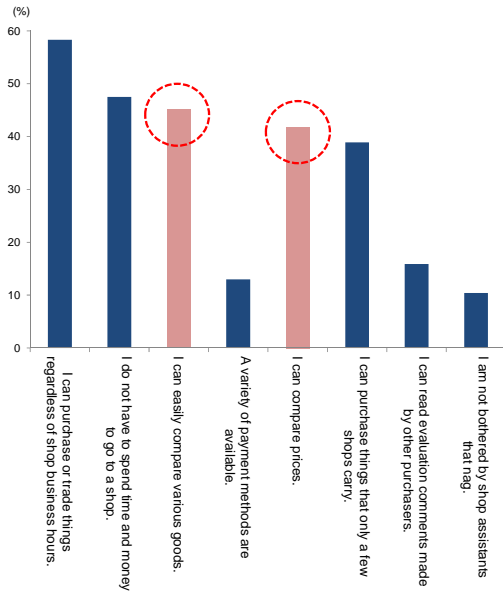
The growing e-commerce market has helped reduce information asymmetry between businesses selling goods and services and households buying them. The internet has enabled households to compare product content and prices almost free of charge. In fact, looking at the reasons for online shopping (**Chart 5**), over 40% of consumers cite “I can easily compare various goods” and “I can compare prices.” Travel packages are among the typical examples of consumers comparing prices online to seek cheaper and better deals. When shopping for home appliances, many people use smartphones to search for the lowest prices and bargain aggressively with store clerks over prices. For consumers, this is a desirable change.

From the perspective of businesses, on the other hand, the growing e-commerce market involves more intense price competition. The internet brings trade in goods and services close to the law of one price, with this movement also expected to affect statistical price trends. Since online sales prices are not subject to the CPI (consumer price index) survey, changes in online prices do not directly influence the CPI. However, expanding internet sales will intensify price competition both on websites and between online and physical stores, thereby exerting downward pressure on the CPI. Kawata and Hirano (2018) analyzed the effects of the online sales expansion on prices using panel data by region, and point out a 0.3 percentage point drop in the CPI growth of internet competitive goods (including household miscellaneous goods and consumables, clothing, culture and entertainment goods, and hairdressing and beauty care products), and a 0.1 to 0.2 percentage point decrease in the growth rate of BOJ-style core CPI (all items less fresh food and energy). These results imply that the expansion of internet sales is further intensifying the competitive business environment, prompting existing retailers to lower their prices and leading to a decline in the CPI growth. It is very interesting that the so-called “Amazon effect” on prices has been quantitatively verified.

To understand the differences in sales prices between websites and physical stores, Cavallo (2017) compared online and offline prices in ten countries including Japan (**Chart 6**). The chart shows that Japan’s average online prices are approximately 13% lower than its offline prices, and about 7% lower if same priced items are included. With all countries combined, the average online prices are roughly 4% (about 1% for prices including same priced items) lower than offline prices, revealing that Japan’s online discount rate is remarkably higher than in other countries. With physical stores involving labor and operating costs, and the labor shortage becoming increasingly serious, Japan will likely continue to maintain relatively low online sales prices. In this sense, it is

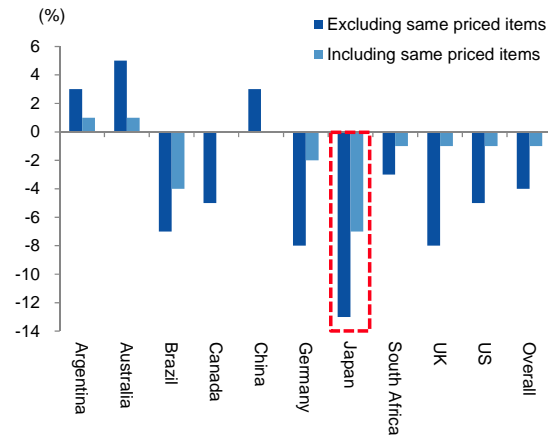
highly possible that the Amazon effect will continuously serve as a structural factor in weighing down prices.

Chart 5: Reasons for online shopping



Source: Made by MHRI based on the Ministry of Internal Affairs and Communications, *Communications Usage Trend Survey (2011)*.

Chart 6: Average price differences between online and offline prices



Source: Made by MHRI based on Cavallo, A. (2017).

(2) Estimating the impact on prices – weigh down CPI growth of furniture and household products, clothing and footwear, and travel-related expenses

Next, this section estimates the impact of the percentage of online expenditure on prices. Unlike Kawata and Hirano (2018), the nationwide CPI data were employed to estimate the effects of an increasing percentage of online expenditure on the growth rate of BOJ-style core CPI, excluding fresh food and energy, as well as the CPI of each category: food, furniture and household products (home appliances, etc.), clothing and footwear, books, and travel-related expenses (accommodations and package tours).

The results revealed that a 1 percentage point year-on-year increase in the online expenditure rate pushed down the growth rate of BOJ-style core CPI (excluding rent, communications, and institutional factors) by around 0.2 percentage points year-on-year. Likewise, the increased online expenditure rate lowered the CPI growth of furniture and household products, and clothing and footwear by about 0.2 percentage points, respectively, and travel-related expenses by roughly 0.1 percentage points (**Chart 7**). As for food and books, the results did not acquire statistical significance between a higher percentage of online expenditure and CPI, probably because these items are low in price and few consumers take the trouble to compare prices. On the other hand, home

appliances and tour packages are high-priced, so consumers most likely make purchase decisions after carefully comparing product prices and content on the internet. Moreover, the results suggested that in addition to the goods featured by Kawata and Hirano (2018), the percentage of online expenditure on services such as accommodations and package tours contributed to lowering prices. This implies that competitive price pressure also affects services (aside from the aspect of whether physical services are consumed on site or at home) because consumers can easily compare prices through the internet before making a purchase decision.

Based on the estimation results, **Chart 8** illustrates the breakdown of contributing factors to changes in the BOJ-style core CPI. As pointed out in Sakai and Hirayoshi (2018), rising raw material costs due to higher oil prices have pushed up the CPI since 2017. In addition, the chart also shows that recent growth in labor costs because of the labor shortage has raised the CPI. Meanwhile, it is notable that the percentage rise in online expenditure (referred to herein as the “Amazon effect”) has contributed to lowering the CPI growth since 2017. The 2017 rate of households using the internet for shopping surged by 6.3 percentage points year-on-year. In the same way, online expenditure expanded year-on-year (+0.7 percentage points), with the Amazon effect tamping down the growth rate of BOJ-style core CPI by an average of 0.2 percentage points year-on-year. The online expenditure in 2018 (January to April average) was up 0.3 percentage points year-on-year, possibly causing the growth of BOJ-style core CPI to fall an average of 0.1 percentage points year-on-year. Despite rising labor and raw material costs, price shifting was slow until recently, partly because online sales growth intensified price competition.²

² Even in the United States, Hatzius et al. (2017) estimates that the Amazon effect reduced core goods inflation by 0.25 percentage points and core PCE (personal consumption expenditures) inflation by 0.1 percentage points, suggesting also a similar effect in Japan.

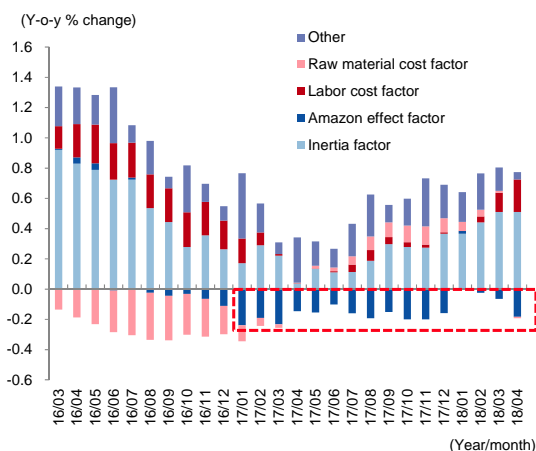
Chart 7: Sensitivity of the CPI growth to the percentage rise in online expenditure (up 1%pt year-on-year)

Food	-
Furniture and household products	-0.2%pt
Clothing and footwear	-0.2%pt
Books	-
Accommodations and package tours	-0.1%pt
BOJ-style core	-0.2%pt

Note: The BOJ-style core CPI excludes rent, communications, and institutional factors (high school tuition and medical fees). The results of food and books did not acquire statistical significance.

Sources: Made by MHRJ based on the Ministry of Internal Affairs and Communications, *Family Income and Expenditure Survey*, *Survey of Household Economy*, and others.

Chart 8: Breakdown of the growth rate of BOJ-style core CPI (contributing analysis)



Note: The BOJ-style core CPI excludes rent, communications, and institutional factors (high school tuition and medical fees).

Sources: Made by MHRJ based on the Ministry of Internal Affairs and Communications, *Family Income and Expenditure Survey*, *Survey of Household Economy*, and others.

4. Expansion of the e-commerce market likely to create new demand while maintaining downward pressure on prices

(1) Potential for the e-commerce market to expand further even with social factors considered and the labor shortage viewed as a risk factor

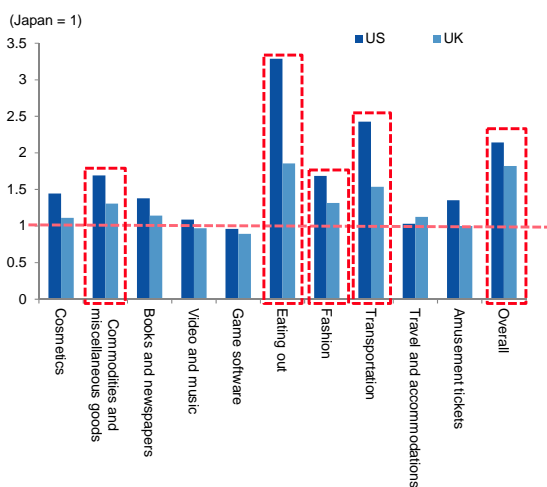
The e-commerce market has great potential for further expansion. In addition to search engines, such as Google and Yahoo!, the spread of social networking sites, including Twitter and Instagram, has allowed consumers to gather information more easily. Today, computers, smartphones, and tablets are indispensable decision-making tools for consumers, and this trend is expected to continue in the future. An international comparison also shows Japan to have greater potential for increasing online expenditure than the United States and Britain in the categories of commodities and miscellaneous goods, eating out, fashion, and transportation (**Chart 9**).

Furthermore, social and demographic factors, such as promoting women's participation in the labor force and an increasing number of single-person households, are likely to boost online expenditure on food as well. In the longer term, with the internet usage rate high among the current young age group, the elderly group in the future is expected to have more internet users than currently, resulting in the internet penetration rate rising throughout all generations. Simply put, supposing that all

generations' online expenditure rates reach the level (5.2%) of the current young age group (34 years old and younger), their expenditure rates will increase by roughly 1.4 percentage points from 2018.

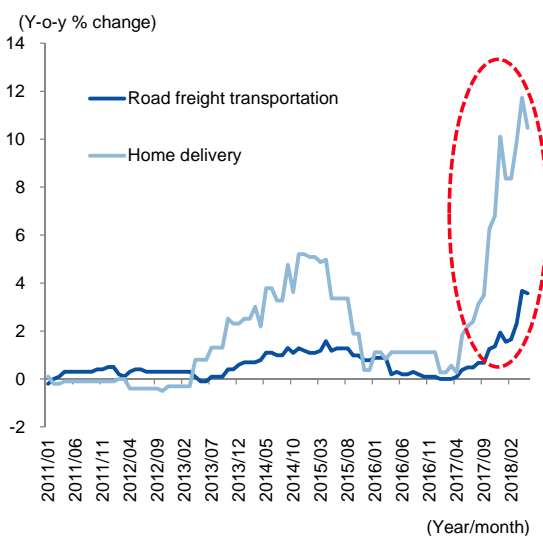
Risk factors possibly curbing e-commerce market growth include supply constraints caused by a labor shortage and rising costs. Unlike physical stores, online retailers have the advantage of lower labor costs for sales clerks. But expanding online sales have created a serious shortage of truck drivers in the transport industry, with service prices for road freight companies, including home deliveries, soaring in recent years (**Chart 10**). This challenge will lead to online retailers losing their advantages over physical stores in terms of expenses, including deliveries. Accordingly, more online businesses may be compelled to change their transaction forms, for example, generating new demand and processing orders (or payment) online while handing out their products at physical stores instead of home delivery.

Chart 9: International comparison of online expenditure rates



Note: Japan's online expenditure rate was standardized as 1.
 Source: Made by MHRI based on the Ministry of Internal Affairs and Communications, *Research on the Present and Future of the Smartphone Economy* (2017).

Chart 10: Changes in services producer price index (SPPI)



Note: Excluding the effect of the consumption tax.
 Source: Made by MHRI based on the Bank of Japan, *Services Producer Price Index*.

(2) Downward pressure on prices likely to weigh down the CPI growth up to 1 percentage point each year

Downward pressure on prices will likely continue with further penetration of the internet.

Several scenarios were created to calculate the impact on the growth rate of BOJ-style

core CPI (**Chart 11**). The scale of future percentage increase in online expenditure needs to be open to wider interpretations, but the scenarios presented in Chart 11 estimate that the growth rate of CPI will fall an average of up to 0.1 percentage points each year. For example, suppose that the generation of frequent internet users grows older with all generations' online expenditure levels matching the current young age group, CPI growth are estimated to fall around 0.01 percentage points each year (cohort scenario). In addition, as shown in Chart 9, the ratio of online spending to individual spending in the United States is about 2.1 times that of Japan. If Japan's percentage of online expenditure rises to the US level in a decade, its online spending rate is projected to rise 0.4 percentage points or more year-on-year each year, reducing the growth rate of BOJ-style core CPI by roughly 0.1 percentage points each year as well (Americanization scenario). While Japanese consumers spend less online than US and UK shoppers, prices in Japan are more likely to be affected by downward pressure from price competition because of the wider gap between online and offline prices than in the US and the UK, as seen in Chart 6. If the e-commerce market expands further than this report predicts, stronger downward pressure will be exerted on prices. Naturally, this downward force alone will not be strong enough to have a deflationary impact on the economy, but considering the recent slow growth in the BOJ-style core CPI at +0.3% year-on-year, this impact cannot be overlooked depending on the scenario. The expanding e-commerce market is therefore an important factor to consider when forecasting prices.³

(3) Evaluation of the expanding e-commerce market: generating demand focusing on the elderly population is the key

The expanding e-commerce market and increasing online spending are favorable situations for consumers in terms of enhancing convenience as well as facilitating product comparisons. In fact, online expenditure rate on various categories, including travel-related expenses, is on an upward trajectory (**Chart 12**). If this trend continues, the prices of furniture and household products, clothing and footwear, and accommodations and package tours will be weighed down, possibly boosting demand for these goods and services.

But how should e-commerce be evaluated in the overall economy? From the perspective of businesses selling these goods and services, intensifying online price competition squeezes their earnings. Looking at the change in output prices DI in the Bank of Japan's Tankan (Short-Term Economic Survey of Enterprises in Japan) (June

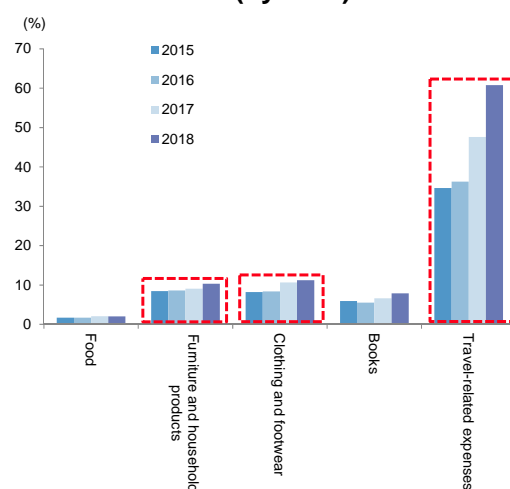
³ Meanwhile, there are other possibilities that rising transport costs affected by growing online sales will push up the CPI in the future, but the calculations in this section do not include these secondary effects.

2018), retailers' terms of trade (change in output prices DI - change in input prices DI) show no sign of improvement, with little progress made in price shifting (**Chart 13**). In addition, even if online spending expands further, selling existing goods and services on the internet is simply a shift in demand from physical stores that does not substantially boost consumption for the economy as a whole (despite greater convenience improving consumer satisfaction). In fact, even though the e-commerce market is on an expansionary trend, individual spending continues to lack momentum in terms of macro-statistics.

Chart 11: Impact of e-commerce market expansion on CPI growth (by scenario)

	Percentage increase in online expenditure per year (%pt, year-on-year)	Impact on the BOJ-style core CPI (%pt, year-on-year)
Cohort scenario Online expenditure average rate reaching the level of the current young age group (34 and younger) in 30 years	+0.05	-0.01
Internet penetration scenario (1) Online expenditure average rate reaching the level of the current young age group (34 and younger) in 10 years	+0.14	-0.03
Internet penetration scenario (2) Online expenditure average rate continuing to grow at the average pace for the past three years	+0.28	-0.07
Americanization scenario Online expenditure average rate reaching the level of the United States in 10 years	+0.44	-0.11

Chart 12: Changes in online expenditure rate (by item)



Sources: Made by MHRI based on the Ministry of Internal Affairs and Communications, *Family Income and Expenditure Survey*, *Survey of Household Economy*, and others.

Note: January to April average in 2018.
Sources: Made by MHRI based on the Ministry of Internal Affairs and Communications, *Family Income and Expenditure Survey* and *Survey of Household Economy*.

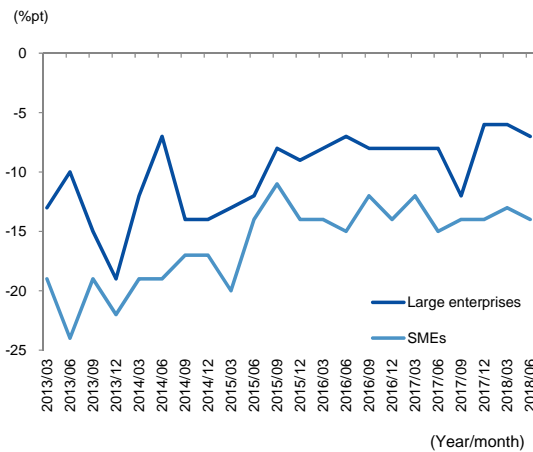
To connect the growing e-commerce market to economic revitalization, businesses need to generate new demand by offering goods or services that have yet to be recognized by consumers. AI can be used to analyze big data on consumers' purchase history to recommend goods and services that satisfy their tastes and needs. In this way, if opportunities are created for consumers to encounter new goods and services, the e-commerce market growth will play a key role in boosting consumption.

And the elderly population holds the key. As pointed out earlier, the elderly engage in online shopping less frequently than other age groups. But as far as senior households using online shopping are concerned, online spending per household is comparable to the level of other age groups (**Chart 14**). If the rate of senior households aged 65 years and older shopping online jumps to the level of the young age group (nearly 60%), their

online spending will rise roughly threefold by simple calculation. It is highly possible to expand the elderly's online consumption by enhancing their internet use through senior-friendly digital devices as well as providing goods and services that can stimulate new demand among the elderly. If AI recommends goods and services to meet the elderly group's needs, for example, new health products and themed travel services, the consumption range is expected to expand further.

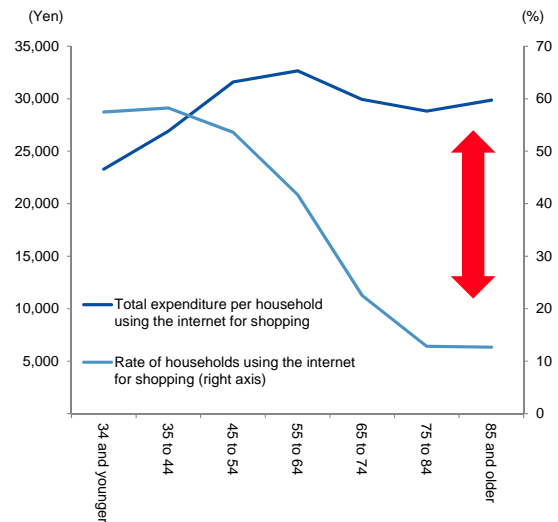
Businesses are now facing an era of stiff price competition, but if they can develop new demand by offering high value-added goods and services, businesses can pave the way to improving sales and earnings. A sustainable wage increase can also be expected along the way. This is the ideal vision for the Japanese economy. Businesses will be tested in their creative ability to capitalize on the expanding e-commerce market as a way to attract consumers.

Chart 13: Changes in retailers' terms of trade



Note: The terms of trade are calculated by change in output prices DI - change in input prices DI.
 Source: Made by MHRI based on the Bank of Japan, *Tankan* (Short-Term Economic Survey of Enterprises in Japan).

Chart 14: Internet usage rate and expenditure using the internet



Note: Two-or-more-person households; January to April average in 2018.
 Source: Made by MHRI based on the Ministry of Internal Affairs and Communications, *Survey of Household Economy*.

Refer to the original Japanese report by clicking the URL below for the reference material and Addendum

<https://www.mizuho-ri.co.jp/publication/research/pdf/insight/jp180712.pdf>