

Japan's trading losses reach JPY20 trillion

—Energy accounts for more than half of the trading losses—

YANAGISAWA Akira

Senior Economist

Energy Demand, Supply and Forecast Group

Energy Data and Modelling Center

Summary

Prime Minister Shinzo Abe set gross national income (GNI) per capita as the most important key performance indicator for the New Growth Strategy. The target is to increase the GNI per capita by no less than JPY1.5 million within the next 10 years. GNI is sum of gross domestic income (GDI) or GDP and net income from the rest of the world. Nominal GDI and nominal GDP show the same values by definition.

GDI and GDP, however, are not identical in real term because real income (purchasing power) decreases by outflow of income to other countries if export prices fall and/or import prices rise. It is trading gains or trading losses that express increases or decreases in real income by changes in export and import prices. Japan recorded trading losses of JPY21 trillion (\$212 billion) in 2013.

Recently, the terms of trade, or TOT, worsened heavily due to a rise of import prices of materials and fuels, and a fall in export prices affected by hard international competition. This resulted in the huge trading losses for Japan.

"Abenomics" have revised the excess appreciation of the yen. Expectations of broad penetration of increases in exports are great. With the worsened TOT that Japan is facing today, any increases in real exports further expand the trading losses. Real income does not increase as much as production does.

Expanding TOT worsens the trading losses. Low TOT partially offset the effect of increasing exports. Therefore, improving TOT by either rising export prices or depressing import prices is longed. Skyrocketing energy prices contribute much to the rise of the import deflator. Furthermore, the substantial increases in energy import quantity that followed the Great East Japan Earthquake in 2011 destabilised the trade balance.

Energy commodities contribute significantly to the expansion of trading losses. Energy accounted for around 60% of the trading losses of JPY21 trillion in 2013.

The base year of the Japanese national accounts is 2005; in that year energy prices were much lower than today. At first glance, the damage to the economy caused by increases in energy imports may appear small, however, the adverse effect by higher energy import prices and quantity is neither tiny nor negligible. Japanese must carefully reconsider the current situation of energy consumption, especially the heavy dependence on high cost fossil fuel-fired power generation. That reduced the real purchasing power by JPY12 trillion (from the produced value added), and for which Japan paid JPY14 trillion using the remaining real disposable income.

Keywords: GDP, GDI, GNI, trading gains, trading losses and terms of trade

GNI is the most important indicator in the New Growth Strategy

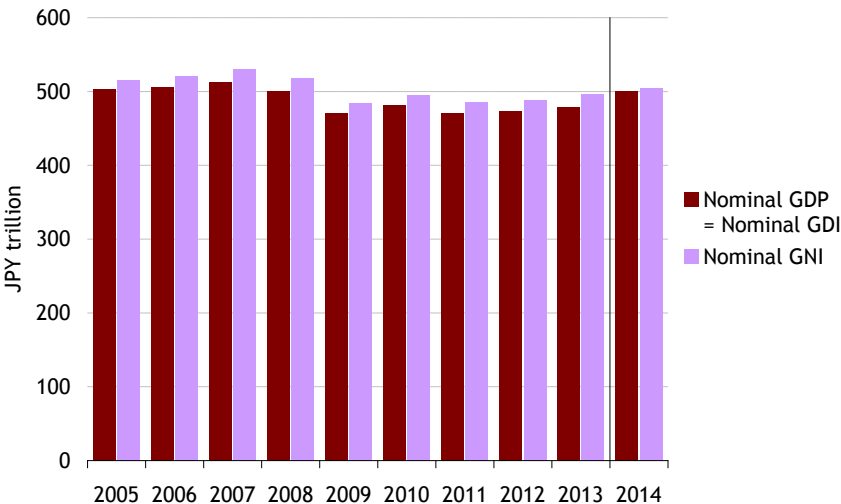
Prime Minister Shinzo Abe set key performance indicators, or KPIs, for the New Growth Strategy. The targets to be achieved are (1) recovering non-residential investments to JPY70 trillion within three years, (2) increasing exports of infrastructures to JPY30 trillion by 2020, (3) doubling the balance of foreign direct investments into Japan or increasing it to JPY35 trillion by 2020, (4) increasing exports of agricultural, forest and fishery products, and food to JPY1 trillion, and (5) placing 10 universities on the list of the world top 100 universities within 10 years (“Speech on the New Growth Strategy,” July 2013). Furthermore, the strategy states that gross national income (GNI) per capita is the most important KPI. The target is to increase the GNI per capita by no less than JPY1.5 million within 10 years.

Gross domestic product, or GDP, is the most popular indicator for measuring the size and strength of the economy or for observing economic trend. What is GNI then? GNI corresponds conceptually to gross national product (GNP), which used to be the major indicator. GNI is sum of GDP, or gross domestic income (GDI) and net income from the rest of the world by definition.

$$\begin{aligned} \text{Nominal GNI} &= \text{Nominal GDI} + \text{Net income from the rest of the world [nominal]} \\ &= \text{Nominal GDP} + \text{Net income from the rest of the world [nominal]}. \end{aligned}$$

Hence, GNI includes income from domestic economic activity and returns from foreign investments, etc. Japan’s GNI of JPY496 trillion (\$5.08 trillion at JPY97.6/\$) in 2013 consists of JPY478 trillion of GDP, which accounts for 96% of GNI, and JPY18 trillion of net income from the rest of the world (Figure 1).

Figure 1: Nominal gross domestic product (GDP) and nominal gross national income (GNI)



Note: Data for 2014 are estimation of FY2014 based on the government’s outlook, on which cabinet decision was made in January 2014.

Source: Economic and Social Research Institute, Cabinet Office, Government of Japan

Setting GNI not GDP as the most important indicator in the New Growth Strategy indicates that the Prime Minister prioritises an increase in income rather than expansion of production, as if we care less about the difference between domestic and national.

Changes in export and import prices must be taken into account in real term

We discussed gross production and gross income in nominal term in the previous chapter. It, however, is harmful to think only in nominal term as the Japanese government and the Bank of Japan have a 2%-inflation target. For instance, it is meaningless that we have 1% growth in nominal term and -1% growth in real term.

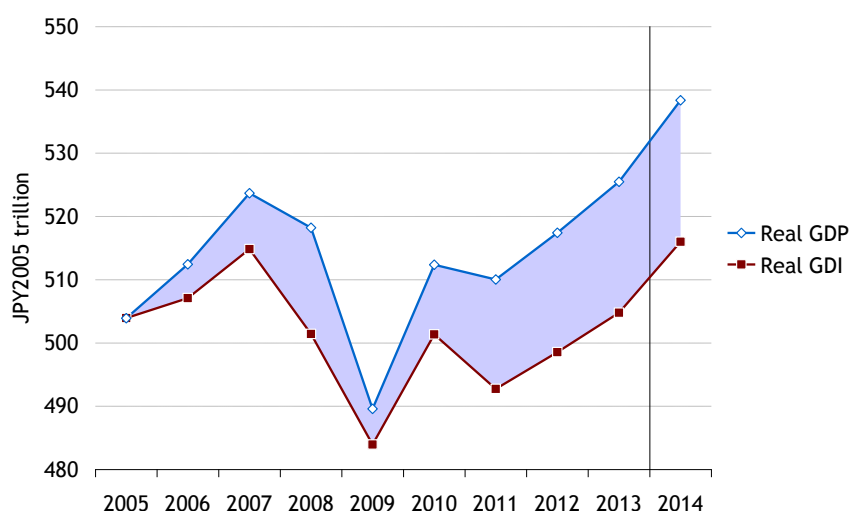
Here, we must pay attention that the relationship between GNI and GDP in real term is different from that in nominal term. The relationship in real term is as follows:

$$\begin{aligned} \text{Real GNI} &= \text{Real GDI} + \text{Net income from the rest of the world[real]} \\ &\neq \text{Real GDP} + \text{Net income from the rest of the world[real]}. \end{aligned}$$

The relationship between GNI and GDI is unchanged regardless of real term or nominal term. Difference exists in relationship between GDI and GDP. Then we focus on real GDI and real GDP hereafter.

GDI and GDP are not identical in real term because real income (purchasing power) is also influenced by changes in export and import prices. Real purchasing power decreases by outflow of income to other countries if export prices fall and/or import prices rise. Japan's real GDI was JPY505 trillion in 2013 (in 2005 prices) whilst its real GDP was JPY525 trillion (Figure 2).

Figure 2: Real gross domestic product (GDP) and real gross domestic income (GDI)



Note: Data for 2014 are estimation of FY2014 based on the government's outlook, on which cabinet decision was made in January 2014.

Source: Economic and Social Research Institute, Cabinet Office, Government of Japan

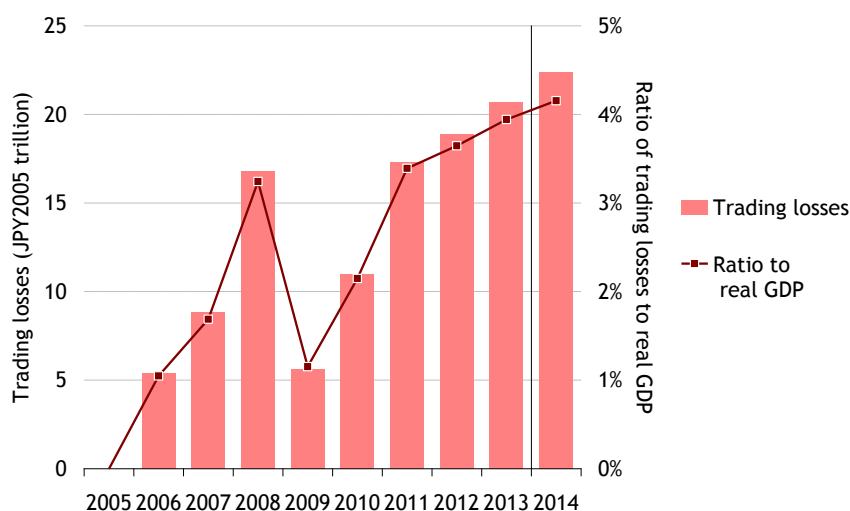
Expansion of trading losses brought by worsening terms of trade

It is trading gains or trading losses that express increases or decreases in real income by changes in export and import prices from a base year. Then real GDI consists of real GDP and trading gains.

$$\text{Real GDI} = \text{Real GDP} + \text{Trading gains.}$$

Japan recorded trading losses of JPY21 trillion in 2013 (Figure 3). This means real income reduced by JPY21 trillion from 2005, the base year. Real GDP increased by JPY22 trillion to JPY525 trillion in 2013 from JPY504 trillion in 2005. Nevertheless, real GDI increased by less than JPY1 trillion to JPY505 trillion from JPY504 trillion due to the huge amount of trading losses. This tiny increases in real income (purchasing power) may be one reason the nationals hardly realise economic growth in addition to decline in nominal wage.

Figure 3: Trading losses and their ratio to real GDP



Note: Data for 2014 are estimation of FY2014 based on the government's outlook, on which cabinet decision was made in January 2014. Trading losses for the base year 2005 are zero by definition.

Source: Economic and Social Research Institute, Cabinet Office, Government of Japan

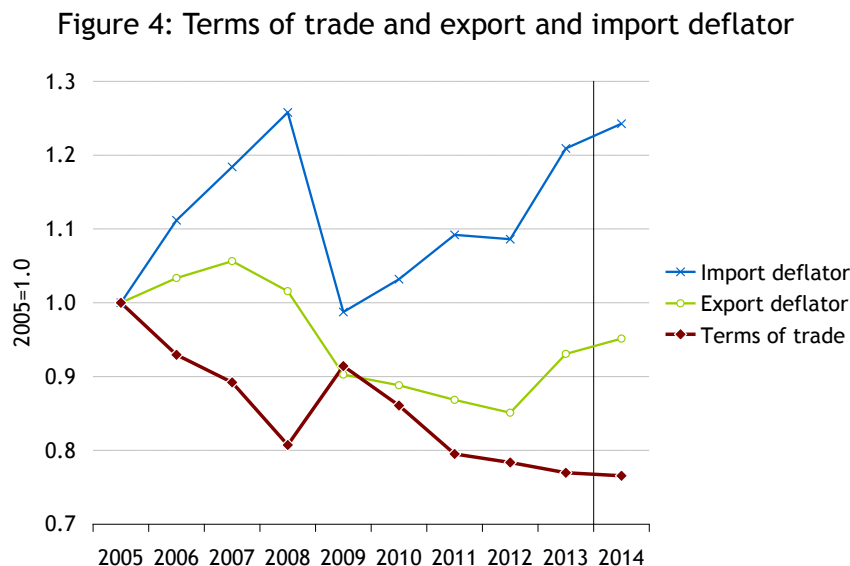
Trading gains T is defined as follows:

$$\text{Trading gains } T = \frac{\text{Nominal exports } X - \text{Nominal imports } M}{\text{Numeral deflator } P} - (\text{Real exports } X_r - \text{Real imports } M_r)$$

National accounts of Japan adopt deflator of total trade – weighted average of export deflator X_p and import deflator M_p – as numeral deflator P ¹.

¹ $P = \frac{X + M}{X_r + M_r} = X_p \frac{X_r}{X_r + M_r} + M_p \frac{M_r}{X_r + M_r}$.

The terms of trade, or TOT, recently worsened heavily being substantially below one because of a rise of import prices for materials and fuels, and a fall of export prices affected by hard international competition (Figure 4)². This resulted in huge trading losses³.



Note: Data for 2014 are estimation of FY2014 based on the government’s outlook, on which cabinet decision was made in January 2014.

Source: Economic and Social Research Institute, Cabinet Office, Government of Japan (export and import deflator)

Longed improvement of terms of trade

“Abenomics” including the unusual monetary easing by the Bank of Japan, have revised the excess appreciation of the yen. Expected increases in export quantity, however, have not yet materialised. Whilst some argue that Japan is influenced by the extended effect of the J-curve, others are pointing to the effect of offshoring of manufacturing bases during a period of excessive yen appreciation. Nevertheless, expectations of broad increases in exports are great.

Expansion of real exports – export quantity – increases directly real GDP. Furthermore, it increases real GDP by stimulating domestic economic activity through the multiplier effect. We, however, should remember that the effect is on real GDI as income, and not on real GDP as production.

² Terms of trade $t = \frac{\text{Export deflator } X_p}{\text{Import deflator } M_p}$.

³ Trading gains T can be shown by using TOT t , real exports X_r and real imports M_r as follows:

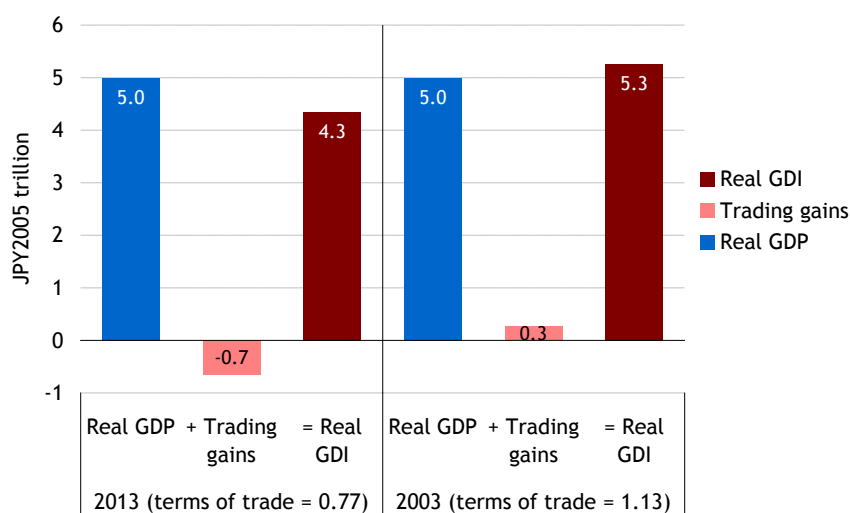
$$T = 2(t - 1) \frac{X_r M_r}{t X_r + M_r}$$

Sign of T – being trading gains or trading losses – depends on whether t is larger or smaller than one because all of t , X_r and M_r are non-negative. T is a monotonically increasing function for t .

Increase in real exports expands rather trading *losses* under situation with worsened TOT as Japan is⁴. Clearly, real GDI does grow as increases in real GDP are larger than increases in trading losses. Income, however, does not increase as much as production does.

We show a numerical example based on the latest data in 2013 and as of 2003, 10 years earlier. Figure 5 shows the effects on real GDP and real GDI if only real exports increase by JPY5 trillion without changes in TOT. In 2003, when TOT was 1.13 (exceeding one), real income would have increased by JPY5.3 trillion as trading gains would increase by JPY300 billion on the top of the increase in real exports by JPY5 trillion. For 2013, contrastingly, increases in real income would be only JPY4.3 trillion due to increases in trading losses by JPY700 billion. The difference in real income is JPY900 billion, or 18% of the original increases in real exports.

Figure 5: Effect by increases in real exports by JPY5 trillion (2013 and 2003)



Note: No change is assumed in domestic demand, imports and all of deflators for simplification.

The benefits are partially offset if exports increase without improvement of TOT over one.

⁴ Consider changes in trading gains T if only real exports X_r increase without changes in TOT t . Partial differential equation of T by X_r is as follows:

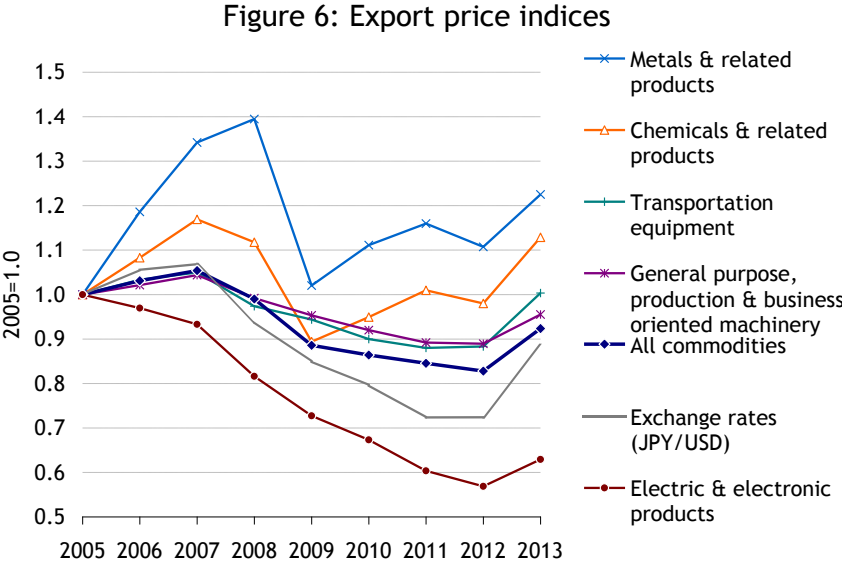
$$\frac{\partial T}{\partial X_r} = 2(t-1) \frac{M_r}{tX_r + M_r} \left(1 - \frac{tX_r}{tX_r + M_r} \right).$$

Sign of $\partial T / \partial X_r$ is same as that of $t-1$ because all of t , X_r and real imports M_r are non-negative letting both $M_r / (tX_r + M_r)$ and $1 - tX_r / (tX_r + M_r)$ non-negative. Today, $\partial T / \partial X_r$ is negative as t is significantly less than one. Then increase in X_r results in decrease in T .

Energy is the primary contributor to the huge trading losses

Worsening TOT expands trading losses and low TOT partially offsets the effect due to increases in exports. Therefore, improving TOT by raising export prices and/or depressing import prices is longed. Why has Japan’s TOT worsened so much then?

Severe international competition makes it difficult for Japan to raise its export prices and this resulted in a sharp drop of the export deflator. Raising export prices in the dollar was not achieved and export prices in the yen plunged when the yen appreciated rapidly after the financial crisis in the second half in 2008 (Figure 6).



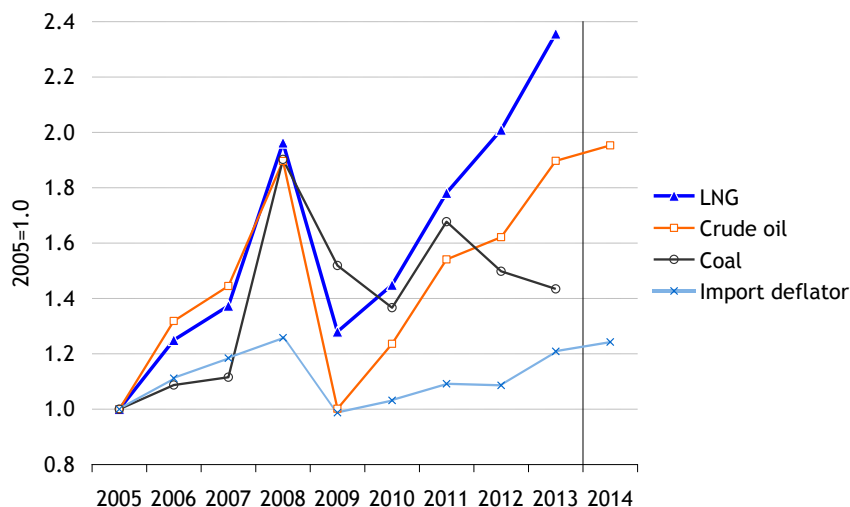
Source: Compiled from Bank of Japan “Corporate goods price index,” etc.

Skyrocketing energy prices contribute much to the rise in the import deflator (Figure 7)⁵. Furthermore, substantial increases in energy import quantity, despite the high prices, after the Great East Japan Earthquake in 2011 also had an effect. Energy imports expanded to JPY27.4 trillion, accounting for more than one third of total imports of JPY81.3 trillion in 2013⁶.

⁵ Depreciation of the yen raises the import deflator and contributes to worsen TOT if prices in the dollar are unchanged. On the other hand, it raises also the export deflator and that contributes to improve TOT. Therefore, depreciation of the yen is neutral for TOT by definition. It, however, may affect TOT because (1) whilst share of trade in the yen was 21% for import in 2H2013, the share was 36% for export, (2) export prices in the dollar may be adjusted corresponding to changes in exchange rates.

⁶ Ministry of Finance “Trade Statistics of Japan”

Figure 7: Energy import CIF prices and import deflator

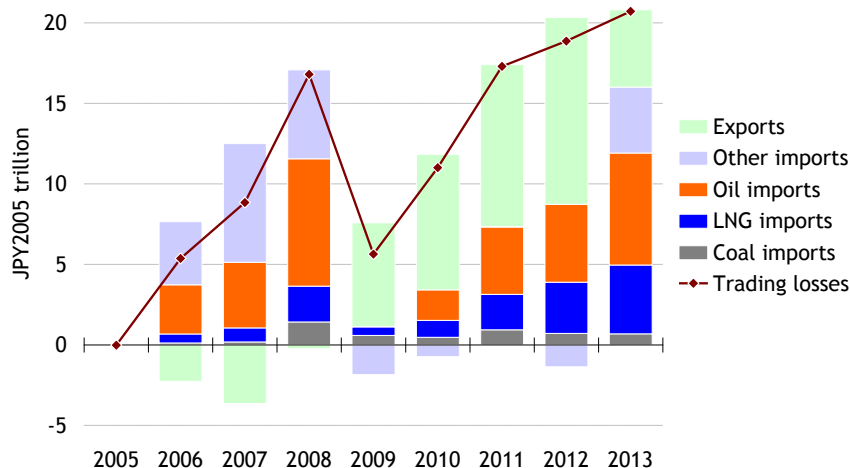


Note: Data for 2014 are estimation of FY2014 based on the government’s outlook, on which cabinet decision was made in January 2014.

Source: The Institute of Energy Economics, Japan (energy); Economic and Social Research Institute, Cabinet Office, Government of Japan (import deflator)

Consequently, energy contributes significantly to the expansion of the trading losses by increasing both the import prices and quantity (Figure 8). Whilst trading losses in 2013 were JPY20.7 trillion, contribution by oil and liquefied natural gas (LNG) were JPY7.0 trillion and JPY4.3 trillion, respectively. Energy accounted for 58% of the trading losses in total.

Figure 8: Contribution to trading losses by energy



Note: Estimated by applying Taylor expansion up to the second order to the identity equation of trading losses.

Reconsideration on the current situation of energy consumption is necessary

The base year of the Japanese national accounts is 2005; in that year energy prices were much lower than today⁷. This may be misleading at first glance, as the damage to the economy caused by increases in energy imports may appear small relative to GDP; unfortunately, the damage is neither tiny nor negligible.

The meaning can be clearly understood if we look at real GDI. Japanese must carefully reconsider the current situation of energy consumption, especially the heavy dependence on high cost fossil fuel-fired power generation. That reduced the real purchasing power by JPY12 trillion⁸ (from the produced value added), and for which Japan paid JPY14 trillion⁹ using the remaining real disposable income.

The most important target of the New Growth Strategy is to increase the GNI per capita by no less than JPY1.5 million within 10 years. This may require nominal GDP growth of around 2.5% per annum in next 10 years with increases in net income from the rest of the world. This path seems feasible if the government's 2%-inflation target is successfully achieved. However, having healthy growth of real GNI is much harder due to the trading losses than in nominal term though the Strategy states nothing in real term. We should examine cautiously the economic situation not to delude ourselves by ostensible growth under the inflation target.

Contact: report@tky.iecej.or.jp

⁷ Import CIF prices in 2005 of crude oil, LNG and coal were JPY35,460/kL, JPY34,222/t and JPY8,367/t, respectively. They were much higher in 2013; crude oil for JPY67,266/kL, LNG for JPY80,657/t and coal for JPY12,003/t.

⁸ Compared with 2005

⁹ In 2005 prices