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Post-quake Bottleneck and GDP Gap

Negative GDP gap in Jan-Mar 2011 GDP widening

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Summary

- We have often heard arguments that the post-Great East Japan Earthquake supply bottlenecks would tighten the GDP gap on the economy. However, spin-off effects of supply bottlenecks on the GDP gap will affect many aspects of the economy, which is hard to measure. Thus, we focused on latent capital input, a component of latent GDP, and analyzed the post-quake relationship between supply bottlenecks and GDP gap.
- In our analysis, post-quake supply bottlenecks indicated three points. First, capital stock breakdowns had a limited impact on the GDP gap. Second, the lower capacity utilization rate had a large impact and the gap temporarily rose to positive territory. Third, supply bottlenecks were not a long-term problem as the GDP gap returned to a standard scenario level when capital stock breakdowns normalized and the utilization rate returned to a standard scenario level.
- The GDP gap estimated by DIR based on the CAO first preliminary GDP estimate widened its decline from the previous quarter (-3.7%) to -4.6% in Jan-Mar 2011. In other words, a demand shortfall of Y26 trillion. This should reflect the plunge in demand following the quake.

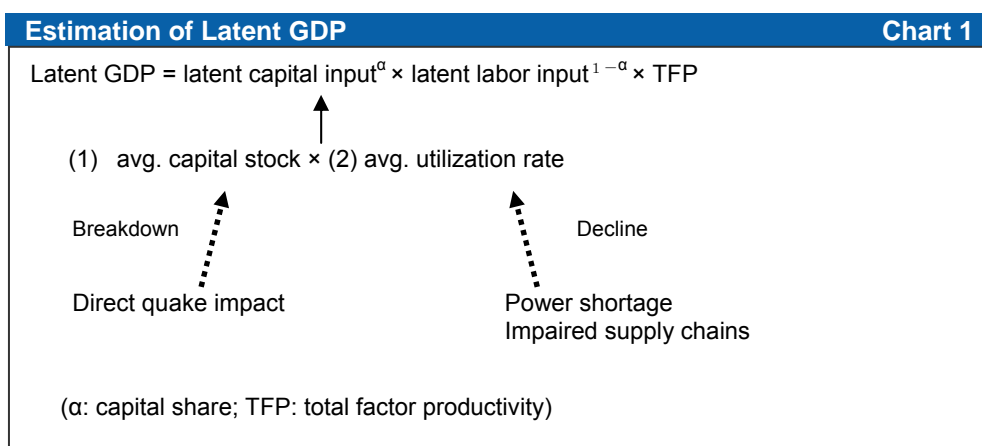
1. Post-quake Supply Bottlenecks and GDP Gap

Supply bottlenecks likely to tighten supply-demand balance

We have often heard arguments that the post-Great East Japan Earthquake supply bottlenecks (capital stock breakdowns, power shortages, and impaired supply chains) would pull down latent GDP, tightening the GDP gap (supply-demand balance on economy). If the GDP gap swings to positive territory, it will create inflationary pressure going forward, raising concerns about stagflation.

However, the spin-off effects of supply bottlenecks on the GDP gap will affect many aspects of the economy, which is hard to measure. At the same time, the latent GDP level differs depending on its definition or estimation method. Thus, we have focused on latent capital input, a component of latent GDP, and reviewed the post-quake relationship between supply bottlenecks and the GDP gap by comparing alternative scenarios and the standard scenario.

We have estimated latent GDP based on a production function approach, using the Cobb-Douglas production function (Chart 1), and according to the Cabinet Office model, in which latent GDP is defined as one that will be achieved through input of production factors at the average capacity utilization rate.¹ Meanwhile, our main focus is the supply bottleneck, which emerged clearly after the Great East Japan Earthquake. Thus, we have confined our analysis to two components of latent capital input: (1) average capital stock and (2) the average capacity utilization rate.² In terms of GDP, the quake brought about a direct impact (capital stock breakdowns) and the accompanied power shortages and impaired supply chains lowered the capacity utilization rate.



Source: Compiled by DIR.

2. Capital Stock Breakdowns

Limited impact on GDP gap

We assumed three alternative scenarios for capital stock breakdowns: (1) a 5% breakdown vs. the standard scenario nationwide, (2) a 2.5% breakdown, and (3) a 1% breakdown (Chart 2.1). The Cabinet Office estimates that the aggregate private corporate sector capital stock in three Tohoku prefectures (Iwate, Miyagi, Fukushima) accounted for 4.5% of nationwide stock (as of 2007). Thus, the first case (5% breakdown) is worse than breakdowns of entire capital stocks in three prefectures.³

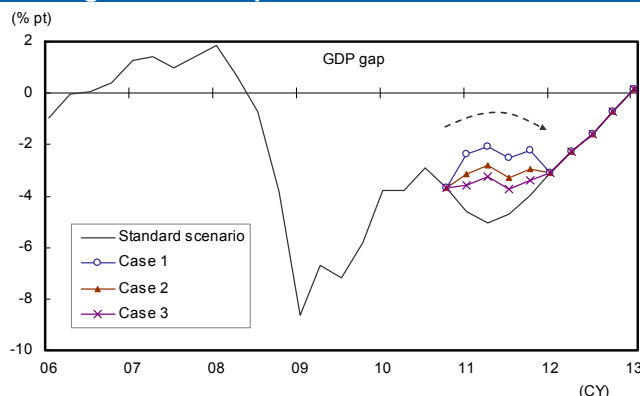
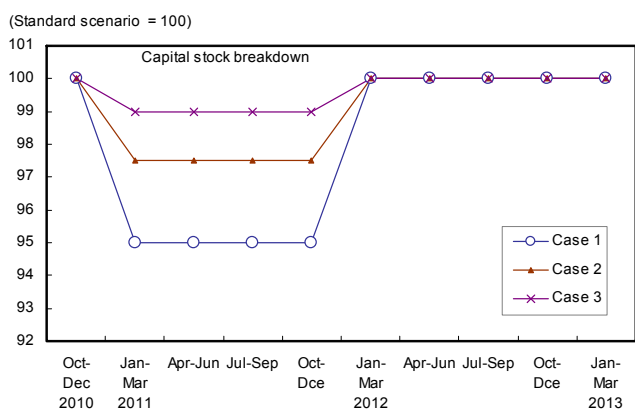
¹ See *Annual Report on the Japanese Economy and Public Finance 2007*, Cabinet Office.

² Capital stock is that of the private corporate sector and excludes social overhead capital.

³ See *Prefectural Economic and Fiscal Model*, Cabinet Office.

In all three scenarios, GDP gaps moved upward but changes were limited (Chart 2.2). In the largest breakdowns (down 5%), the negative GDP gap did not narrow significantly. We can point out that if capital stock breakdowns due to the quake tighten the local supply-demand balance, the impact of breakdowns on the macroeconomy is likely to be limited.

Impact of Capital Stock Breakdowns on GDP Gap | **Change in GDP Gap**
Capital Stock Breakdowns Chart 2.1 | **Chart 2** Chart 2.2



Source: Ministry of Economy, Trade, and Industry; Ministry of Health, Labour, and Welfare; Ministry of Internal Affairs and Communications; Cabinet Office; compiled by DIR.

Notes: 1) Real and latent GDPs in standard scenario: DIR estimates assume latent GDP growth rate to be flat from Jan-Mar 2011.
 2) GDP gap = (real GDP – latent GDP) / latent GDP.

3. Decline in Capacity Utilization Rate

Positive GDP gap temporary

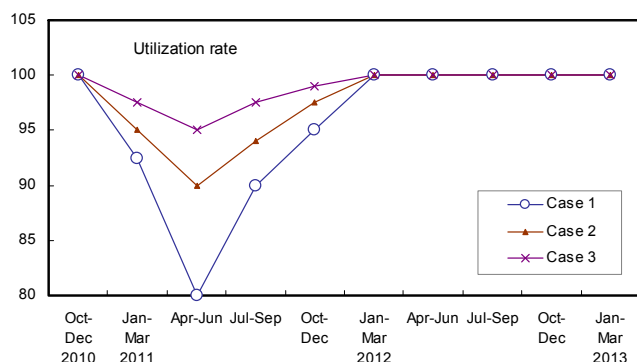
We assumed three patterns of declines in the capacity utilization rate: (1) 20% down vs. the standard scenario nationwide, (2) 10%, and (3) 5% (Chart 3.1). The first case (20% down) is worse than that seen in March 2011 (-18.4% y/y; manufacturing industry). As factories have begun to run again at a moderate pace from April, a decline worse than the first case is unlikely to happen going forward.

In all three scenarios, the GDP gap shifted upward significantly. In the first case, the gap first rose to positive territory and then returned to the standard scenario level once the utilization rate recovered. Thus, we believe that the upward shift of the GDP gap will disappear when power shortages and impaired supply chain problems ease. Currently, the transportation equipment industry, the sector that occupies a large weighting in the capacity utilization rate (about 26%), has pulled down the overall utilization rate and its recovery warrants a close watch going forward.

As the post-quake plunge in the capacity utilization rate is an extraordinary case, we believe such a plunge is excluded in estimates of latent GDP by various public and private institutions as a one-time factor. However, we witnessed the utilization rate slumping due to the unprecedented disaster, and we believe scenarios factoring in the slide in the utilization rate better reflect actual conditions.

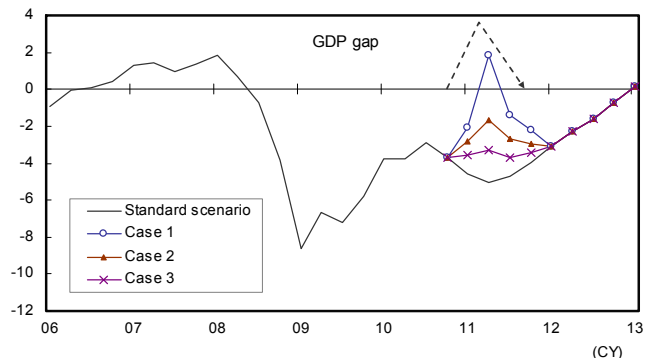
Impact of Change in Utilization Rate on GDP Gap Decline in Capacity Utilization Rate Chart 3.1

(Standard scenario = 100)



Change in GDP Gap Chart 3.1

(% pt)



Source: Ministry of Economy, Trade, and Industry; Ministry of Health, Labour, and Welfare; Ministry of Internal Affairs and Communications; Cabinet Office; compiled by DIR.

Notes: 1) Real and latent GDPs in standard scenario: DIR estimates assume latent GDP growth rate to be flat from Jan-Mar 2011.
2) GDP gap = (real GDP – latent GDP) / latent GDP.

Conclusion

Supply bottlenecks temporary

In the above analysis, post-quake supply bottlenecks indicated three points. First, capital stock breakdowns had a limited impact on the GDP gap. Second, the lower capacity utilization rate had a large impact and the gap temporarily rose to positive territory. Third, supply bottlenecks were not a long-term problem as the GDP gap returned to the standard scenario level when capital stock breakdowns normalized and the utilization rate returned to the standard scenario level.

In this report, to determine the impact of capital stock breakdowns and that of declines in the capacity utilization rate, we have reviewed such impacts separately. However, such impacts drag down latent GDP simultaneously. Therefore, scenarios showing the combined impacts of the two factors will better mirror the situation than our current analysis. However, excluding unlikely cases (first cases for capital stock breakdowns and capacity utilization rate), the GDP gap remains in negative territory.

In this report, we analyzed scenarios that supply bottlenecks would tighten the GDP gap. However, we should review the possibility that deterioration in consumer and corporate confidence, accompanying the quake and tsunami, nuclear power plant accident, and impaired supply chains, will pull down domestic demand, widening the negative GDP gap. Meanwhile, as the post-quake change in supply-demand balance is likely to be temporary, swiftness and steadiness in recovery measures will be key going forward.

Supplement: GDP Gap and Inflation

Negative GDP gap widened

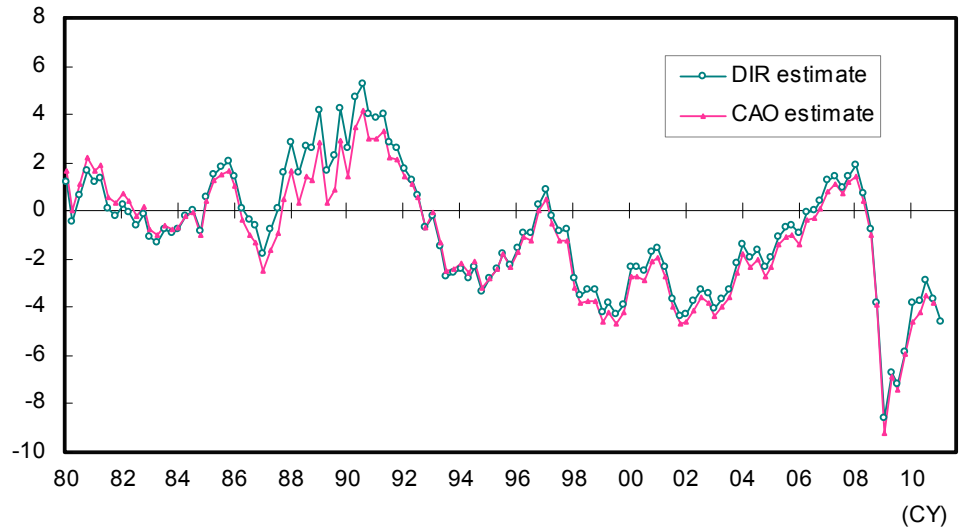
In this report, we estimated latent GDP in accordance with the Cabinet Office estimation method. Thus, the DIR estimated GDP gap moves in tandem with the CAO estimated one. In Jan-Mar 2011, the GDP gap decline (DIR estimate) widened to -4.6% from the previous quarter (-3.7%).⁴ In other words, a demand shortfall of Y26 trillion. This should reflect the plunge in demand following the quake.

In the meantime, the GDP gap and inflation rate tend to have a close relationship over the long term, and the former leads the latter by three to four quarters.

⁴ Private sector capital stock not available yet; we assume slide of 1% q/q.

However, the margin of change in the inflation rate corresponding to the change in GDP gap has narrowed compared to the past trend. Therefore, the GDP gap has to rise to a level nearing +2% (DIR estimate) for Japan to get out of a deflationary trend.

GDP Gap Estimate (%) Supplement Chart 1

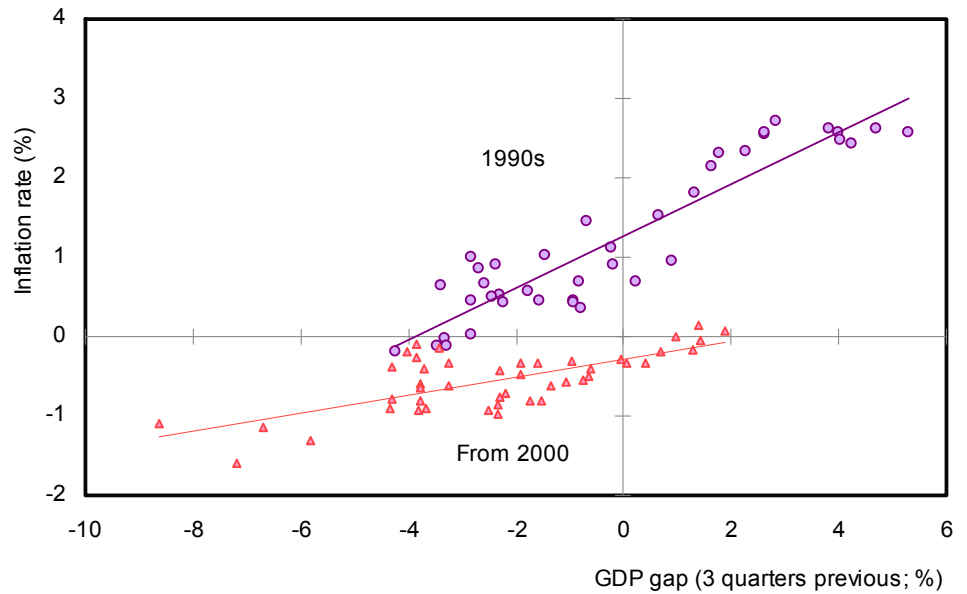


Source: Ministry of Economy, Trade, and Industry; Ministry of Health, Labour, and Welfare; Ministry of Internal Affairs and Communications; Cabinet Office; compiled by DIR.

Notes: 1) GDP gap varies depending on definition and estimation method, allowing for some degree of difference.

2) $GDP\ gap = (real\ GDP - latent\ GDP) / latent\ GDP$.

GDP Gap and Inflation Rate Supplement Chart 2



Source: Ministry of Economy, Trade, and Industry; Ministry of Health, Labour, and Welfare; Ministry of Internal Affairs and Communications; Cabinet Office; compiled by DIR.

Note: Inflation rate: CPI excl. foods and energy; SA by DIR.