Aggregate Gap Analysis for CPEs

1. Aggregate Gap (總供求缺口)

Shortage is not the same as scarcity (Fang et al. p.387)
(短缺) (稀缺)
Demand is not the same as wants
(需求) (需要)

In CPEs, it is particularly easy to mix up the two.

2. Is shortage determined by "excess demand" or "insufficient supply"?

- Excess-demand hypothesis: Fang et al. Fang et al. (樊綱等，《公有制宏觀經濟理論大鋼》，上海三聯書店，一九九四年)
- Insufficient-supply hypothesis: Hu (胡汝銀，＜短缺歸因論＞，《經濟研究》，87 年 7 月號)

Structural disequilibria and aggregate analysis

Recall what we discussed about disequilibrium and shortage in the first semester. Now going into macroeconomic analysis about centrally planned economies, we face particularly serious problems about "aggregation":

Is aggregate analysis **adequate** in a situation of structural disequilibria?

Are there problems which may render aggregate analysis **misleading** or even **counter-productive**?

The answers are unfortunately "yes". Be careful about macroecnomic analysis of CPEs.

(1) Resource immobility and structural imbalance

Ref: 鄧英淘、羅小朋，《經濟研究》87 年 6 月號。

(i) Excess demand may be structural (as a result of resource immobility) rather than aggregate (e.g. overall monetary

expansion)

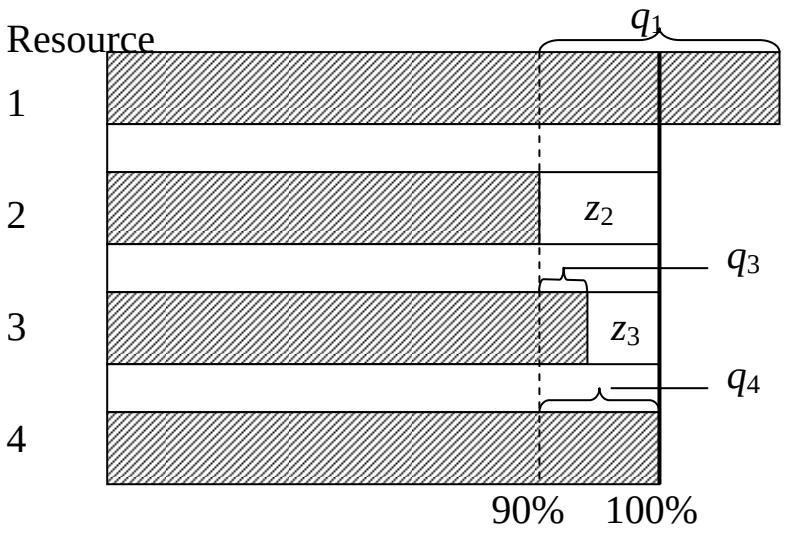
Two cases: X and Y

(a) X and Y as substitutes: resource immobility will result in a high propensity to expand. Suppose the demand for X falls because of substitution into Y, enterprises producing X will not be under serious pressure to wind down their stock of resources (labour, capital, raw materials, etc.) Enterprises producing Y, however, will feel the need to order additional inputs (including final capital goods and consumer goods (for their labourers)). As a result, aggregate demand is increased by an amount matched by a rise in the slack in enterprises producing X, but effective supply would remain unchanged.

(b) X and Y as complements. Suppose X has a productive capacity far greater than Y, but then it requires an input from Y. A typical example in China under economic reform is this: X – electricity industry; Y – coal mining industry. Local authorities are given autonomy and eager to build electricity plants which depend on coal to generate power. The coal industry is however concentrated only in a few regions and under the control of the central government. Ultimately, effective supply of electricity from X will be severely limited by output from Y.

Under such a situation, care must be taken in distinguishing effective supply from notional supply. Resource immobility in effect drives a big wedge between the two at the aggregate level. Notional aggregate supply can be arrived by adding up all the stocks in the economy and then estimating the flow of output that can be produced, using indicators such as capital-output ratio and productivity ratios. Given resource immobility and structural disequilibria, effective supply may fall far below the imputed level.

If we look at the case of an *n*-sector model of complementary resources, we can see that the effective supply of an economy may be limited by the bottleneck sectors that produce complements to the other sectors which notionally have greater productive capabilities.



Each resource in the figure is associated with a strip. Both the available portion of the resources, indicated by the shaded area, and their actual uses are given in %. The bolded line shows a 100% fulfilment of the plan while the dotted line represents a 90% execution, which turns out to be the actual level of output.

Of resources 1 and 4, enough is available for 100% fulfilment. There are however shortages in resources 2 and 3, represented by the unshaded areas z_2 and z_3. Overall, resource 2 turns out to be the bottleneck sector (there is no slack in it). Slacks q_1, q_3 and q_4, on the other hand, are present in the other three resources.

Given different degrees of "resource precipitation" in an *n*-sector economy, it is not meaningful to concentrate on aggregate supply/demand. To increase supply generally would be resource-wasting, the government should concentrate on increasing the supply of resource 2, then resource 3 etc. On the other hand, it is obviously unnecessary.

(2) Structural disequilibria: rationing

Ref: Leon Podkammir, "Microeconomic Disequilibria in Centrally Planned Economies:……" Journal of Comparative Economics, 1989, pp.47-60, section 5.

e.g. max U = ($\ln q_1 + \ln q_2 + \ln L + \ln s$)/4 ---------- (1)
where q_1 and q_2 are the quantities of goods 1 and 2 consumed, L is leisure and s is saving. The representative household would maximize (1) subject to

$$p_1 q_1 + p_2 q_2 + wL + s \leq Y + wT \qquad \text{---------- (2)}$$

where p_1, p_2 – prices for goods 1 and 2, w – the wage rate, Y – income, and T – time resource of the household.

We can assume $p_1 = p_2 = w = 1$, and $Y = T = ½$

Eq.(2) may then be rewritten as:

$$q_1 + q_2 + L + s \leq 1 \qquad \text{---------- (3)}$$

By the reference of rationing/quantity constraints, q_1 and q_2 can be lumped together as an aggregate. So (1) can be rewritten as ($q = q_1 + q_2$):

$$U = 0.5 \ln q + 0.25 \ln L + 0.25 \ln s \qquad \text{---------- (1')}$$

If we max (1') s.t. (3), we obtain

$$q_1^* = q_2^* = L^* = s^* = ¼$$

so $q^* > q_1^* + q_2^* = 0.5$

Now suppose that

$$q_1 \leq 0.1 \qquad \text{---------- (4)}$$

i.e. q_1 is rationed.

So we now have to max (1) (not (1')!) s.t. (3) and (4).

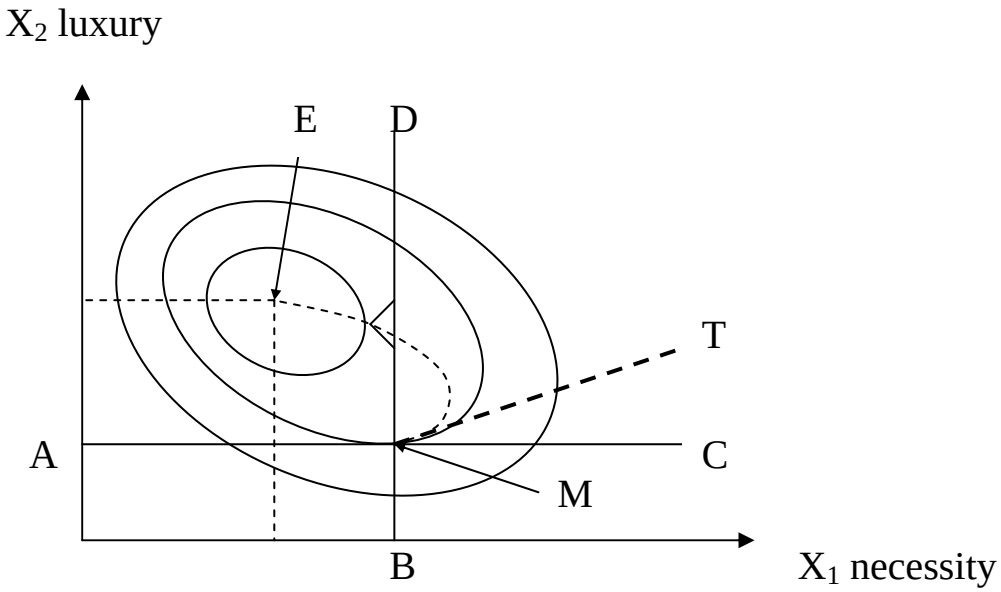
The results are:

$$q_1^* = 0.1,\ q_2^* = 0.3,\ L^* = 0.3,\ s^* = 0.3$$

Now if we concentrate on the aggregate analysis, i.e. treating q as an aggregate and fail to distinguish between q_1 and q_2, we will not be able to detect any <u>shortage</u>. In fact, we may even obtain the mistaken conclusion that there is aggregate <u>excess supply</u> as

$$q = 0.5 > q_1^*(0.1) + q_2^*(0.3) = 0.4$$

So any macroeconomic policy derived under it would be counter-productive. Another case is:



Read, Tsang, S. K., "A Note on the Aggregation of Slack and Shortage in Centrally Planned Economies", Economics of Planning, 1990, No.3.

(3) Alternative measure of macroeconomic disequilibrium Podkammir, JCE, 1989, section 6.

Repressed inflation = (equilibrating rise in the price index) × (actual supply)
= (equilibrating rise in supply) × (actual price index)
= **Forced saving** ---------- (5)

Presumably, the above equation should hold: increasing prices and increasing supply should have the same result! Why not?

Unfortunately, this MAY NOT BE TRUE!!

From the equation, some misleading macroeconomic policy

conclusions may be drawn e.g. if forced saving is estimated to be say ¥100 million, the planners may be led to think that the choice between (1) raising prices (without changing the volume of supply; and (ii) increasing supply, perhaps through imports (without changing the price level) are the same.

In fact, given forms of disequilibrium, e.q. (5) does not hold. Let's look at Podkaminer's examples.

Suppose we have the following utility function:

$\max U = (\ln q + \ln L + \ln s)/3$ ---------- (6)

s.t. $\bar{p}q + \bar{w}L + s \leq Y + \bar{w}T$ ---------- (7)

Assume that $Y = T = ½$, (7) can be rewritten as

s.t. $\bar{p}q + \bar{w}L + s \leq \frac{1}{2} + \frac{\bar{w}}{2}$ ---------- (7')

So we max (6) s.t. (7')

Let $\bar{p} = \bar{w} = 1$ and we introduce rationing

$q \leq 0.2$ ---------- (8)

The programme becomes

$\max U = q^{1/3} L^{1/3} s^{1/3}$ ---------- (9)

s.t. $q + L + s \leq 1$ ---------- (10)

$q \leq 0.2$ ---------- (11)

What are the solutions?

$q^* = 0.2; L^* = s^* = 0.4$ ---------- (13)

Now it can be easily checked that if there is no quantity rationing, i.e. eq. (11) is eliminated, then max (9) s.t. (10) (without (11)) would yield the following solutions:

$q^0 = L^0 = s^0 = \frac{1}{3}$

Hence the degree of forced saving:

$(s^* - s^0)) = 0.4 - \frac{1}{3} = \frac{1}{15}$ ---------- (12)

On the other hand, we can assume that eq.(11) holds (i.e. rationing occurs) and calculate the equilibrating rise in the price index. In other word, we substitute (13) into (9) and endogenize p^0 and w^0 so that the household would choose $q = \frac{2}{10}$ voluntarily (remember the theory of virtual price?)

i.e. we max U = $q^{\frac{1}{3}} L^{\frac{1}{3}} s^{\frac{1}{3}}$

s.t. $p^0 q + w^0 L + s \leq \frac{1}{2} + \frac{w^0}{2}$

and try to find p0 and w0 that yield the results in (13)

$q^* = 0.2$; $L^* = s^* = 0.4$

Podkammir (1989, p.54) says that "it may be easily checked that $p^0 = \frac{10}{7}$ and $w^0 = \frac{5}{7}$ is such a unique pair of equilibrium price and wage indices.

Now the degree of repressed inflation (= equilibrating rise in the price index × actual supply) turns out to be

$$\bar{q}(p^0 - \bar{p}) = 0.2(\frac{10}{7} - 1) = \frac{3}{35}$$

So forced saving $(\frac{1}{15}) \neq$ repressed inflation $(\frac{3}{35})$

* Moreover, to restore equilibrium, the real price of $q = \frac{p^0}{w^0} = \frac{10}{7} \div \frac{5}{7} = 2 \neq \frac{p^*}{w^*} = 1$

* Now, giving our analyses in the first term, we know that forced

saving may increase/decrease/remain unchanged in the light of different degree of rationing (and by extension, different degree of repressed inflation).

It is even possible to construct examples in which positive savings (forced) are accompanied by an absence of repressed inflation, or more dramatically, by the price level leasing too high (the opposite of R.I.). A sufficient condition is that the quantity constraint on leisure causes more disutility than the ration on the consumption good. If the virtual price of leisure is greater than the shadow price of consumption, then the restoration of equilibrium may involve a rise in real wage, i.e. a real deflation $p^0/w^0 \downarrow$.

* The problem of aggregate analysis is that it concentrates only on the measurement of aggregate excess supply/demand – a single-dimensional indicator, which may be ambiguous/irrelevant or even meaningless in the ease of structural disequilibria over
(i) *n* – goods
(ii) multi-markets such as goods – money – labour markets.

The following comment of Podkammir's (1989, p.59) is well put:

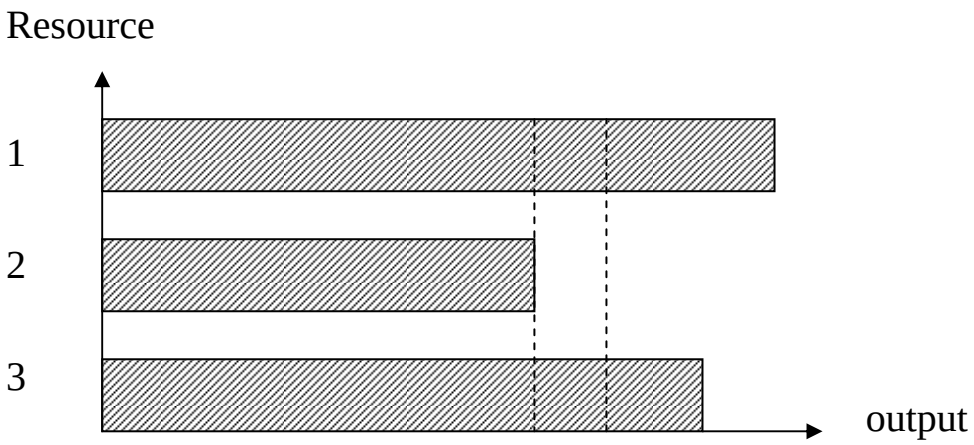
"The paradoxical outcomes from the measurement of macroeconomic disequilibria appear because **such measurements attempt to characterize two-dimensional vectors with one indicator.** This, of course, cannot work. Macroeconomic equilibrium involves two independent quantities (labour supply, dd for goods), or two independent "ac. parameters" (price and wage rates). Hence its measurement requires two indicators: one for the commodity and the other for the labour market. Macroeconomic model seeking to measure disequilibrium with one indicator such as forced saving or inflationary overhang do not merit serious consideration.

(4) Some countervailing considerations

Is aggregate analysis totally useless? Some don't think so.

e.g. 樓繼偉，＜論總需求、總供給、國民收入超分配——冀論總量政策與結構政策之間的關係＞，《經濟研究》，八七年第十期。

A key point is that given structural disequilibria in the case of complementary resources, e.g.



The bottleneck sector (2 here) effectively constrains aggregate output. We then can have an estimate of how aggregate demand should grow by looking at the probable growth rate of the bottleneck sector, because the growth of resources 1 and 3 would be ineffective (not complemented by 2, just as the expansion of electricity plants not supported by growth in coal output). Suppose it is 5%, then we can be relatively secured in asserting that aggregate dd should not grow by much more than 5%.

Remember that we are talking about complementary resources (substitution is not considered). So if we can identity the bottleneck sector(s), aggregate analysis and policy conclusions **may still be useful**.