DISCUSSION PAPER

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SIMULATING THE EFFICIENCIES OF ALTERNATIVE INDUSTRY LOCATION SUBSIDIES IN KOREA

(SUMMARY)

by

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The views presented herein are those of the author, and they should not be interpreted as reflecting those of the World Bank.
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SUMMARY

The Korean government uses many devices to influence the location decisions of firms. In a survey of 141 Seoul region establishments that had moved, eleven different government programs were cited as having affected the firms' location decisions. Some of these government programs lower the cost of borrowing faced by the firm; others lower the price of land; still others lower labor costs, and still others offer the firms specific capital or services through public infrastructure investments.

Firms do not view the programs equally, nor do the firms participate in them all with equal frequency. Fifty of the 141 firms in the survey reported credit subsidies as the most important subsidy available to them (8 more firms cited such subsidies as being of some importance); 15 firms reported land price subsidies as most important (32 more cited land price subsidies as being of some importance). No other subsidy mechanism was cited by more than 4 firms as most important, although three schemes that essentially give cash grants (or tax reductions) were each relied upon by 20 to 30 of the 141 firms.

All the policies share a common trait: they are meant to induce a firm to locate elsewhere than where the firm
would choose without government involvement. At first
blush, one might think that if each of the policies can
induce a firm to choose a location preferred by
government, it doesn't matter which policy government
relies upon. But this is not true; some policies are
better than others. The purpose of this study is to
ascertain which policies are best for Korea and why.

The key to understanding why some location policies
are better than others is the recognition that many
location policies will influence production decisions by
the firm as well as location decisions. Land price
subsidies will induce firms to use more land and less of
other inputs in production; credit subsidies for capital
purchases will induce firms to use more capital; wage
subsidies will induce the hiring of more labor.

Such input choices determine the actual resource cost
of producing a firm's output, and the different subsidy
schemes can result in different costs. A firm will choose
inputs to minimize the costs incurred by the firm in
producing its output. If subsidies face the firm with
artificially low prices for some inputs, the actual
resource cost of the firm's output will differ from the
cost borne by the firm. And the most efficient (least
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costly) mix of inputs for the firm with subsidies may differ from the mix the firm would have chosen without subsidies.

Of course, it is the very aim of the subsidy to make the costs borne by the firm less than the actual resource costs. That savings for the firm is the carrot which induces the firm to accept the government's preferred location. However, it is an undesirable side effect if the subsidy causes the firm to raise the actual resource cost of its production above what it would otherwise be. Ideally, one would like the subsidy to leave the firm's mix of inputs fixed at the least cost level, while simply lowering the firm's share of those costs. But when the subsidy mechanism induces the firm to alter its input mix, then costs rise above their minimum level. In economists' jargon, such an increase in costs is the "deadweight loss" associated with the subsidy scheme.

Some subsidy plans bring no deadweight loss. Schemes that do not change the costs of inputs at the margin, i.e. that leave unchanged the added costs of increases in any inputs, give no incentive to alter the firm's input mix. Such schemes bring no deadweight loss. For example, exempting the firm from capital gains taxes on its old plant or site has no effect on the prices of inputs (land, labor, and capital) at the firm's new location, and hence
would not cause the firm to choose any but the lowest cost input mix at its new location. Any other form of "lump sum" grant to the firm would similarly bring no deadweight loss.

Economists frequently argue in favor of lump sum subsidies because of their efficiency. However, the political reality is often that pure cash grants to firms are politically untenable. Moreover, roundabout lump sum grants sometimes cannot be made large enough to gain cooperation from the firm; for example, nearly all firms in the Seoul survey found the capital gains exemption of negligible importance. Consequently, to offer firms large enough inducements to alter location choices, subsidy mechanisms that do alter input prices must often be considered.

But are the credit subsidies and land price subsidies offered by the Korean government the best mechanisms available, or might some other devices, such as wage subsidies, work better? This is the question we address.

We compare alternative location subsidies using a simulation model of firm's input choices. The simulation model incorporates econometric estimates of input demands for nine Korean manufacturing industries. The model permits examination of wage subsidies, land price
subsidies, credit subsidies (for capital acquisition only or for land and capital acquisition), and subsidies in the form of improved public infrastructure.

Qualitatively, there are two keys to deciding which of two input price subsidies is more efficient. First, for a given price reduction, subsidizing the input that is less easily substituted for others will bring less deadweight loss. In essence, if the subsidized input is a poor substitute for others, the subsidy will not cause much of a change in the mix of inputs used by the firm, and hence will bring little deadweight loss. But there is more to the story because the required price reduction may not be the same for both inputs.

Recall that both subsidies must offer the firm the same benefit, the same cost reduction—a benefit large enough to offset the cost disadvantage of the government's preferred location. (If there were no cost disadvantage, the firm would select that location without intervention.) A subsidy on an input that the firm uses a great deal requires a smaller price reduction than a subsidy on an input that the firm uses little of.

Consequently, government will induce less deadweight loss by subsidizing inputs that make up a large fraction
(share) of the firm's costs and that are poor substitutes for other inputs.

Similar criteria apply to choosing among investments in public infrastructure. For a given expense by government, investment in infrastructure that is a good substitute for other inputs brings less deadweight loss. Once government has made its expenditure, the more the firm can reduce its costs by decreasing the use of other inputs, the lower the total cost of resources used under the subsidy scheme. But for two types of infrastructure investment, the required expenses may not be equal. If one item is highly valued by the firm, less of it can be offered and less deadweight loss induced.

Consequently, government will induce less deadweight loss by providing infrastructure investments in items that are highly valued by the firm and are easily substituted for other inputs used by the firm.

The task of the simulation model is to quantitatively balance these various criteria and ascertain which policy schemes are most effective in Korea.

Before we can discuss the quantitative findings of the study, an important analytical caveat must be discussed. We have outlined how subsidies can lead to unnecessary cost increases--to deadweight losses--by
facing the firm with artificially low prices for some inputs. A premise in that analysis was that the unsubsidized prices faced by the firm were not already "artificial", i.e., that those prices reflected the value of the resources elsewhere in the economy (and hence their opportunity cost when used by the firm for production).

If a subsidy is placed on an input whose price is already artificially high, the effect is to reduce the existing distortion. Such a subsidy will lower, not raise the actual resource cost of the firm's production, and will yield a pure economic gain, not a deadweight loss.

For some years, Korea's macroeconomic development policy has called for the rationing of loans. Large firms have received extremely preferential treatment, with few bank loans being made to small and medium size firms. Small and medium size firms have been left to finance their capital and land acquisitions either through internal financing or in the curb market. Anecdotal evidence suggests that the curb interest rate is prohibitively high for most firms, and that firms are constricted in size by their limited capacities for internal financing.

Our simulations indicate that the cost of the Korean macro credit rationing policy is not low, amounting to as
much as 4 percent of land, labor, and capital costs incurred by the manufacturing sector.

Even if the development benefits from the credit policy justify its cost, limited exceptions to the policy can probably be made without jeopardizing those goals. Consequently, the government has found a highly efficient industry location policy tool in loan guarantees to small and medium sized firms. The simulations indicate that loan guarantees recoup as much as twenty percent of their costs through reductions in the actual resource costs incurred by the beneficiary firms.

It is crucial to note that if the Korean government were to alter its policy of credit rationing, continued reliance on credit subsidies for location policy would be extremely costly. The simulation model results indicate that in the absence of credit rationing, credit subsidies are markedly less efficient than either land or wage subsidies.

Although it is encouraging that the most widely used location subsidy mechanism in use in Korea, credit subsidies, is in fact the most efficient, it is unfortunate that the second most widely used mechanism, land price subsidies, are actually less efficient than a mechanism which is hardly used at all, wage subsidies.
Indeed, if Korea steps back from credit rationing, wage subsidies would be the most efficient input subsidy the government could use in its location policies. From these results it is clear that the relative efficiencies of explicit subsidy schemes will depend on the entire pattern of distortions introduced by implicit macro development policies.

Finally, the simulations offer some weak evidence regarding the efficiency of infrastructure investments. We find that infrastructure investments are markedly less efficient than other devices unless the cost of such investments to government is markedly less than they would be to the individual firm. Thus government is best off limiting its infrastructure investments to the provision of goods and services that can be widely shared by several firms in an area.