APPLIED WELFARE ECONOMICS AND POLICY ANALYSIS

■ Theory of Second-Best

- Lipsey and Lancaster (1956) made the following statement about economic policy:

"The general theorem for the second-best optimum states that if there is introduced into a general equilibrium system a constraint which prevents the attainment of one of the Paretian conditions, the other Paretian conditions, although still attainable, are, in general, no longer desirable"

- negative corollary of this is that, *a priori*, no way to judge between situations where some of the Paretian optimum conditions are fulfilled while others are not

- Lipsey and Lancaster argue that theory of second-best shows the "futility of 'piecemeal welfare economics'" - to apply rules for a Pareto optimum to only one sector of an economy may move an economy away from second-best

- suppose an economy consists of a private monopoly, a set of competitive firms, and a publicly owned firm, which has to decide how to price in the "public interest"

- if it behaves competitively, it produces more output, relative to the monopolized good, than required by Pareto optimality

- if it behaves monopolistically, it increases excess of competitive goods relative to both itself and the monopoly

- typical second-best situation: any policy makes some things worse and some better; no policy by publicly owned firm can restore Pareto optimality due to existence of the monopoly

- publicly owned firm must aim at a second-best policy, designed to achieve best that remains open to the economy - in general terms, impossible to be more definite than this

- this article came as a shock to many economists, and has had a significant impact on the theory and practice of policy

- the Lipsey-Lancaster conclusion was not entirely new, however, second-best reasoning having been prevalent in various areas of applied welfare economics

- early 'second-best' results were developed in public finance, e.g. Ramsey (1927), but Lipsey and Lancaster really put the argument on the map

- the Lipsey-Lancaster General Theorem of the Second-Best assumed that there is a real-valued, differentiable function:

$$F(x_1,\ldots,x_n) \tag{1}$$

which is to be maximized subject to a constraint:

$$\Phi(x_1,\ldots,x_n) = 0 \tag{2}$$

- solution to this is the Paretian optimum if (1) is interpreted as elements of the consumption vectors of all households, and if (2) is transformation function, given technology and initial resources

- **first-order condition is:**

$$\frac{\delta F}{\delta x_i} - \lambda \frac{\delta \Phi}{\delta x_i} = F_i - \lambda \Phi_i = 0, \quad i = 1,\ldots,n \tag{3}$$

- **if n^{th} good is numeraire, necessary conditions for an optimum are:**

$$\frac{F_i}{F_n} = \frac{\Phi_i}{\Phi_n} \quad i = 1,\ldots,n-1 \tag{4}$$

which is the familiar first-best condition of marginal rates of substitution being equal to the marginal rates of transformation

- **Lipsey and Lancaster tried to formulate an additional constraint that would cover obstacles to achieving first-best, so suppose for one of (4):**

$$\frac{F_1}{F_n} = k \frac{\Phi_1}{\Phi_n} \quad k \neq 1 \tag{5}$$

- **the optimization problem now becomes:**

$$F - \lambda^{/}\Phi - \mu(F_1/F_n - k\Phi_1/\Phi_n) \tag{6}$$

- where the first-order conditions are:

$$F_i - \lambda' \Phi i$$

$$- \mu \left[\frac{F_n F_{1i} - F_1 F_{ni}}{F_n^2} - k \frac{\Phi_n \Phi_{1i} - \Phi_1 \Phi_{ni}}{\Phi_n^2} \right] = 0, \quad (7)$$

$$i = 1,\ldots,n-1$$

- if we denote Q_i and R_i as:

$$Q_i = \frac{F_n F_{1i} - F_1 F_{ni}}{F_n^2}, \quad R_i = \frac{\Phi_n \Phi_{1i} - \Phi_1 \Phi_{ni}}{\Phi_n^2}$$

- the necessary optimum conditions are:

$$\frac{F_i}{F_n} = \frac{\Phi_i + \mu/\lambda'(Q_i - kR_i)}{\Phi_n + \mu/\lambda'(Q_n - kR_n)}, \; i = 1,\ldots,n-1 \qquad (8)$$

- in the second-best optimum, it follows that, unless $\mu = 0$, conditions for first-best optimum will not hold:

$$\frac{F_i}{F_n} \neq \frac{\Phi_i}{\Phi_n} \tag{9}$$

- from this, Lipsey and Lancaster's statement is made

- these conditions are quite complex - a great deal of information would be required even to determine the sign of the second derivatives F_{ni}, Φ_{ni}, etc., so it would be difficult to know which way to sign (9)

- much of the debate over this result concerned:

> **(i) the origin and form of the additional constraint (5) were questioned**
>
> **(ii) the complexity of the rules for second-best, and attempts to identify cases where first-best is still valid**

- Nature of Additional Constraint

(a) Some have argued that suppose for an initial state of economy that a condition in (4) is violated, and it is *technically* impossible to fulfill this condition, along with all others

e.g., government has to raise revenue to produce a public good, but non-distorting tax schemes are unavailable

Such a constraint is irremovable, so if market economy cannot reach first-best by itself, government cannot reach it either as constraints are strictly binding - i.e., Lipsey-Lancaster optimum does not exist

(b) Others argue (5) is a *behavioral* constraint on policy, i.e., certain measures may be feasible, but are not at government's disposal - law may prohibit the use of policy instrument

Policy constraints then have important implications for general theory of second-best:

- it cannot be known beforehand whether policy constraints prevent first-best or not

- actual impact of policy constraints will depend on behavior of agents in the economy

- many forms of policy constraint imply there can be no *general* second-best optimum conditions

Dominant terminology nowadays is to define second-best problem as allocation problem with policy constraints regardless of whether or not first-best optimum is possible

- First-Best Rules for Second-Best Problems

Lipsey and Lancaster argued their second-best conditions are so complicated, they cannot be used for policy

Many economists began to seek out where first-best conditions still relevant for controllable part of economy - restoring *piecemeal* approach to policy used by Meade (1955) and others

e.g., if sectors are independent or negligibly interdependent, first-best may be attainable in one sector and not another (Mishan, 1962)

Problem with argument:

- in most countries taxes, distortionary rules and regulations, etc. emerge as constraints affecting economy as a whole

- attempts to obtain general and easily applicable rules based on this type of separability have not succeeded

Conclusion: even though outcome of literature on second-best is disillusioning, the Lipsey-Lancaster theorem has made economists much more careful about providing policy prescriptions