Sugden and Williams Notes

Chapter 2

p 14 The marginal rate of time preference (MTPR) is the marginal rate of substitution (MRS) across periods. If 1+r is the MTPR, then we can use r to discount future returns to their present value. If we discount only net returns, then we get a net present value (NPV). Define C_t as the net return in period t=0,...,T (T could be infinity). Net returns are positive if benefits exceed costs in period t, and (weakly) negative otherwise.

NPV is given by $\sum_{t=0}^{T} \frac{C_t}{(1+r)^t}$, or, in continuous time, $\int_{t=0}^{T} \frac{C(t)}{(1+r)^t} ¶t$.

If the discount rate (1+r) is not identical from period to period, you could discount by r(t). A good trick is that as T goes to infinity, if C is constant over time, NPV=C/r.

para 2: What if there's no credit market and c1=$10 and c2=$20? Is it still a good project? What is the MTPR here?

P 16 If the interest rate i gives the price of period 2 consumption, then for everyone (who maximizes) MRS=MTPR=1+i.

p 18 This book was written before Thatcher closed the pits (coal mines).

p 20 Are the two project evaluation strategies really identical? What if both projects have negative net present value (NPV)?

P 20 The internal rate of return (IRR) is the discount rate such that NPV=0.

p 22 Why is IRR1>IRR2 not decisive? Because an IRR of 20% on a $10 investment is worse than an IRR of 10% on a $100 investment. The investments are not *scaleable*.

p 23 Interdependent projects are easy. Consider projects A and B. You have four alternatives to consider: (1) A only; (2) B only; (3) A and B; and (4) neither A nor B.

Chapter 3 Opportunity Costs vs Accounting Costs

p 30 Make all the possible courses of action explicit. 'Opportunity cost' is what is foregone as a result of engaging in a course of action.

'Opportunity costs are costs that are incurred if you do a project that are not incurred if you do not do the project.'

p 31 Train example

Costs: wages and fuel—accounting costs are exactly opportunity costs (unless you can't get rid of your labour or fuel!).

Trains—if you look at the accounts, you get some depreciation allowance, which is not equal to what you get if you don't do the project—the sale value of the train.

Benefits: tickets.

P 32 Marginal cost (MC) doesn't generally equal average cost (AC), but MC is what matters when trying to determine the opportunity cost of changes in input use. How do you get information on MC? After all, firms don't just go around changing scale for the benefit of the analyst. Presumably, if they did change scale a lot, it is because technology is changing, and so even the changes in scale can't help you identify MC.

You could use input demand analysis if you have data on many firms (but you still wonder about identification).
You could break accounting component costs into fixed and variable costs, and then assume linear costs (cost=fixed+q*variable). This strategy is very common.

P 37 Price scaling for inflation is equivalent to increasing the nominal MRTP. Whatever you do, you should use all nominal or all real quantities in appraisal. If you are using reals, make sure goods prices are real. For example, if using reals, and general inflation is 2% and computer inflation is -30%, then you must discount projected computer costs by -28%.

Chapter 4 What Discount Rate?

P 44-5 People have different MRTPs. Which should you use? Should you aggregate them?
If they all have access to a perfect capital market, then they will adjust their consumption profiles over time to equate their MRTPs with the interest rate. The interest rate is the price of holding money today instead of saving it for tomorrow. Thus, everyone has the same MRTP in competitive market equilibrium, and it is equal to the interest rate i.

P 44 Why don't we need to worry about the distinction between income and consumption? Because people put their consumption where they want subject to an income constraint if capital markets are perfectly competitive.

P 46 Unfortunately, capital markets are not perfect (any student loan holders among you?). Thus, people will disagree about NPVs, and disagree about which projects are best.

P 47 They will disagree over other arrangements, for example, about the optimal timing of benefits. Firms also have different borrowing and lending rates.

P 48 For current lenders, use the rate they lend at. For current borrowers, use the rate they borrow at. That is, use the rate they face at the margin.

P 48 Public agencies are a little different (even if they are trying to maximize profit—eg, commercial crown corporations like BC Hydro). They are often capital constrained—that is, they are not allowed to borrow as much as they like. Thus, they may resort to alternative financing arrangements that are similar, but not identical, to borrowing. For example, many public agencies lease their capital, so that the debt doesn't show up.

P 48 Sometimes governments explicitly state a discount rate to be used for project appraisal.

Chapter 5: Uncertainty

p 54-5 Probabilities are necessarily subjective—some person supplies them.

P 56 First order stochastic dominance(FOSD) is satisfied if one cumulative distribution function (CDF) is entirely above another one. If f(x) is the density of net benefits x,

$$\text{FOSD if } \int_{-\infty}^{T} f(x_1)\P x > \int_{-\infty}^{T} f(x_2)\P x \;\forall T$$

If FOSD is satisfied, then the project with the higher CDF is preferred no matter what risk preferences are used in evaluation. FOSD only ranks some distributions, not all of them.

P 57 You might also rank by expected value (EV).

EV is equal to $\int_{-\infty}^{\infty} f(x)x\P x$, so EV dominance requires $\int_{-\infty}^{\infty} f(x_1)x_1\P x > \int_{-\infty}^{\infty} f(x_2)x_2\P x$.

P 58 The certainty equivalent (CE) of a project is the net benefit that, if received for sure, would result in the same utility (or shareholder value) as f(x). Defining u(x) as utility, the certainty equivalent is given by $u^{-1}\left(\int_{-\infty}^{\infty} f(x)u(x)\P x\right)$.

The book says that the "certainty equivalent is approximately equal to the expected value ... [if] the gamble is small ...[and] other risks faced are not correlated". Are these conditions likely to be true? Does this just mean that the certainty equivalent converges to the expected value as the project becomes riskless (the gamble becomes small)?

P 60 Can risk be summarised in a risk premium? If the risk premium represents the probability of failure (of zero return), then it is just the multiplier to get expected NPV. If it represents uncertainty, then it is wrong, because risky benefits are worth less and risky costs cost more.

Chapter 6 Input Constraints

p 76 If inputs are constrained, then maximising NPV implies maximizing NPV per unit of the constrained input. For example, if capital is constrained, then do (nonscaleable or limitedly scaleable) projects in order of their return *per dollar of capital*.

P 77 The *shadow price* is the return to, or opportunity cost of, a rationed good. See Figure 6.1 and Table 6.2. In the figure, the step function is the demand curve and the vertical line is supply. The (nonmarket) shadow price is 29 cents, because that is the marginal value of that capital in its next best use (more of project B). This shadow price is not the market price of anything.

P 79 Why don't we use shadow discount rates? Because we want to maximize NPVs, not IRRs.

Why is there a whole chapter on capital rationing? Many public agencies are simply not allowed to borrow—hospitals in many Canadian jurisdictions, many US states are not allowed to borrow without special permission by referendum, and some aren't allowed to borrow at all.

P 82 "A project with positive NPV (at taxpayers MTPR) should be done, no matter what the capital constraint." The reason is that it is 'self-financing'. If you could move all the returns to the present (through a bank, for example), then new capital 'magically' appears.

Chapter 7 The Objective in Cost-Benefit Analysis

p 90 A potential pareto improvement (PPI) is possible if one can find a feasible allocation which yields a pareto improvement (PI) if resources are suitably (and costlessly) transferred post-facto. Consider a space of total income for two individuals. Draw an endowment E, and a wiggly line represent the set of feasible allocations. The feasible allocation which features the maximum *sum* of income is a PPI from *any* endowment in the feasible set, even if it is not a PI from that endowment.

Cost benefit analysis (in its standard form) seeks PPIs. As such, it typically seeks to maximize the sum of monetary (or monetized) rewards. Thus, cost-benefit analysis can be seen as indifferent to distribution.

The important thing here is that the post-facto costless transfers don't actually happen. If they did, and the allocations would be post-facto pareto improvements (not just potential). The test of whether or not an allocation A is a PPI compared to the endowment E is often called the 'compensation test'. This is because if the people in A can write cheques to each other in *compensation* for the change and still be better off than they were in E, A is a PPI over E.

P 91 I am hazy on Sugden and Williams' dichotomy between the two approaches to justifying the cost-benefit objective function.

P 91 The 'decision-making' approach allows that actual policy makers (presumably elected folks) need to know about the sum of monetary rewards to make their decisions, and will worry about other things (like distributional implications) when they make their decisions. Here, we should note that even strictly positive economists can make predictions about the distributional implications of policy choices. The policy maker can then use this information and her knowledge of what is best for society as a whole to make the decision.

P 92 Alternatively, the cost-benefit analyst might take what the authors call a 'paretian approach', wherein they try to inform the policy maker of the best project in a more universal sense. Rather than having the policy maker aggregate all the information (like NPVs and distributional and other consequences), the cost-benefit analyst plays the role of the policy maker and aggregates the considerations herself.

p 94 Welfare is comprised of efficiency and equity. "Cost-benefit analysis should look for the efficiency part only". However, if there are indifference curves over equity (an inequality index over money) and efficiency (total money), then this is equivalent to maximizing a welfarist social evaluation function over individual utility (which depends on money) (Donaldson 2002).

P 91,5 Even if you don't favour the potential pareto criterion due to its distributional indifference, you might argue that governments can make these potential compensations real by way of its coercive power. However, it seems to me that if you think the potential pareto improvements are actually feasible pareto improvements, then you should just call them that.

P 97 The perfectly competitive model zeroes out lots of effects, so it 'contains' the scope of welfare effects that need to be measured. For example, with competitive input markets, p=MC=Marginal social value.

P 98 Even if you think distribution matters, and you think potential compensations won't actually be done, there is still an argument to use the potential pareto improvement criterion. If governments already have the power to optimize the distribution of income and well-being, then they can redo the optimization after the project is done, and everything will be great again.

Chapter 8 Shadow Pricing in Cost-Benefit Analysis, Input Constraints, Taxes and Market Power

p 99 For a firm, the gross market price typically equals the opportunity cost *for the firm* (it measures what the firm sacrifices).

P 99 For a government, the market price of an input will not give the marginal social cost (that is, opportunity cost) of the input if:

1. there are externalities in production,
    a. for example, positive externalities like technological spillovers, which cause the price to exceed the marginal social cost,
    b. or, for example, negative externalities like pollution in the production of steel, which causes the marginal social cost to exceed the price;
2. the market isn't competitive,
    a. for example, if the seller is monopolistic (as with a perfect union), so that the price exceeds the marginal social cost,
    b. or, for example, if the buyer is monopsonistic (as with a mining firm or a government monopoly occupation like surgeons), so that the marginal social cost exceeds the price;
3. information problems distort the input market,
    a. for example, if there is hidden information (adverse selection) as in the market for used goods, where the market for certain goods may not exist,
    b. or, for example, if there is hidden action (moral hazard) as in the market for work where effort matters, where the market price (which includes an efficiency wage premium) for the good exceeds the marginal social cost (the marginal value of leisure).

p 99 It isn't really stated, but the outputs of government projects are typically not competitively priced, so we need to assess the marginal social *benefit* as well.

p 99 To value things where the market price is misleading, we need *shadow prices*.

p 99 The input constraint example from Chapter 4 showed that the appropriate shadow price is the price of the input that would induce the constrained level of use.

p 102 What is the shadow price of labour? If the labour market is competitive and so forth, then the shadow price is just the market price.

1. What if there is involuntary unemployment,
    a. for example, because firms pay wage premia to lower turnover, or to induce effort from workers, or get better workers, or to get workers to internalise firm goals (gift exchange),
    b. or, because workers are able to raise their own wage through collective (unions) or individualistic rent or quasirent extraction,
    c. or, because there are institutional or customary constraints like minimum wages that limit the scope of market wages.

2. Take for example, a minimum wage environment where there is excess supply of labour, and where people volunteer labour in a zero/one fashion depending on their reservation wage (valuation of leisure/nonmarket activity). The market wage is w3, and n1 workers get the job, though n3 workers want it. Every employed and involuntarily unemployed person has a reservation wage less w3.
3. What is the shadow price of labour here? If workers were allocated to jobs in order of reservation wages (there is no reason to think they would be), then the marginal social cost of labour is w1.
4. Thus, there are bounds on the opportunity cost of labour, probably $w1 < MSC < w3$.

p 105 What do we do about taxes? Taxes in input markets make it so that prices do not reveal the marginal social cost of inputs.

1. You can rewrite eq (8.1) as *gross price - new tax revenue*. This also works for the material on muliple taxation in the appendices.
2. The intuition that works for me is as follows. The gross price is the marginal social value (opportunity cost) for new uses of the same input. However, if some new input is produced on behalf of the project, then new tax revenue is generated. This new revenue has no welfare effect (because distortions and deadweight loss are ignored so far), so it should be subtracted off the calculation of total social costs.
    a. Thus, if all the input is coming from new production, then all the input generates new tax revenue, all of which should be subtracted off. This results in using the supply price (which is net of taxes) times the quantity as the social cost.
    b. On the other hand, if all the input comes from old production, there is no new tax revenue, and nothing is subtracted off. This results in using the consumption price (which includes taxes) times the quantity.
    c. So, what you need to do is *predict* the change in tax revenue that the project causes, and subtract this off of the gross cost of all the inputs.
    d. Another rationalisation is this: if taxes are *not very* distortionary and input markets are competitive and there are no externalities, then opportunity cost of inputs really is almost equal to the gross cost minus net new tax revenue.

p 107 Okay, so taxes are easy. What about if the supply price is not the opportunity cost of the producer? For example, monopolists charge more and produce less. Then you need to resort to either accounting or statistical type methods to recover the cost function of the firm.

p 107 It is unstated, that even if the supply price is equal to the opportunity of the producer, this does not mean that the opportunity cost of the producer is equal to the social cost. If there are any externalities this equality doesn’t hold.

Chapter 9: Big Projects and Price Changes

p 113 Projects considered up to now didn't change prices.
p 113 define *consumer surplus* (CS) as the measure of how much better or worse you are in one environment than another.
p 113 define *compensating variation* (CV) as the amount the individual would pay to secure the project (which comes with a price and income).

V(p0,y0-CV)=V(p1,y1) equates utility from y0 less CV to utility with project
invert around y0-CV to get
y0-CV=C(p0,V(p1,y1))
CV=y0-C(p0,V(p1,y1)) or CV=C(p0,y0)-C(p0,V(p1,y1))

Obviously, if p0=p1, then CV=y0-y1
The figures are helpful to think about CV for a project which changes only prices.

p 114 Consider figure 9.1. Price goes up from p1 to p2, and quantity goes down from q2 to q1 *for an individual*.

1. At worst, this person could need (p2-p1)q1 to be as well of as before. They'd need exactly this much if they were completely unable to substitute to other goods.
2. At best, this person could need (p2-p1)q2 to be as well of as before.
3. So, maybe these provide bounds to the monetized welfare effect of the price change.
4. We could break the price change into a sequence of very small changes and get that the total CV is equal to the funny shape that crawls up the demand curve.

p 118 Define *producer surplus* (PS) as the measure of how much suppliers of factors (such as labour) are better off in one environment than another.
p 118 It is quite analagous to CS, except that it is drawn from information in the supply curve.
p 119 Figure 9.4 shows a PS measure. PS is typically *positive* when the price goes up.
p 120 Consider the same labour market environment as above, where workers get jobs in order of their reservation wage. If the wage goes up, new people get jobs, paying close to their reservation wages. But the old people just get paid more for what they were willing to do for less. This is the origin of the producers' surplus.
p 127 Compensated (or Hicksian) demand curves capture income effects.
p 128 Figure 9.9 shows how the compensated demand curve traces out the demand as price changes but utility stays constant (rather than income staying constant). The authors draw the compensated demand curve as a straight line between the demand curve at ya and the demand curve at yb. However, since the compensated demand curve is needed to estimate the 'income effect inclusive' value of yb (ya+CV), you cannot draw the marshallian demand curve D(yb) without first knowing the compensated demand curve Dc.
p 129 The authors say that: (1) income effects are small so they don't matter; and (2) that they are not easy to estimate. Claim (1) may or may not be true, depending on the problem. Income effects are large if the CVs are large or if the demand curve is highly responsive to income. Claim (2) is not true. We can estimate the compensated demand curve via structural modelling of the cost function.

Chapter 10: Indirect Effects of Price Changes (General Equilibrium Considerations)

p 134 We have been considering single markets up to now. In general, it is not possible to change a price in one market without changing prices in other markets due to the fact that consumers and producers can substitute in the face of the price change.

p 134 General Equilibrium (indirect) effects are hard to predict. You need a general equilibrium model. Only the simplest GE models are analytically tractable. In more complex cases, you'll need a computable GE simulation.

p 134 Even with good prediction, aggregation of all effects can be difficult. Which effects (CV changes) should be counted, and which should be considered as part of the direct effect?

p 135 An example of effects that should not be counted is in Figure 10.1a and 10.1b. Closing a rail service (which was provided at zero cost to the producer) must neccessarily hurt consumers. It reduces their opportunity sets. In Figure 10.1a, you see this loss as area ABC, which covers the surplus lost as we raise the price to beyond what anyone is willing to pay.

p 135 People then substitute. They increase demand for bus service (which is costless to the provider), pushing demand out to Db(pr') in Figure 10.1b. It looks like there is increased CV here, from area DEF to area DGH, and it looks like the increase in Figure 10.1b is larger than the loss in Figure 10.1a. However, intuitively, we know that this cannot be so.

p 136 The change is surplus comes only from the direct effect.

p 136 You might ask, what if there was an extremely good substitute for the closed rail service. That is, what if the bus service was just as cheap and almost as fast as the rail service. Then, people would substitute to the bus service, and not lose very much. This would be reflected in the demand curve for the rail service as highly elastic (flat) demand, because if the rail company raised its price even a little, it would lose all its customers. The fact that demand is not so elastic in Figure 10.1a means that the bus service substitute is not a very good one for lots of people.

p 137 What if the bus service supply curve wasn't flat? What if the increased demand resulted in a price increase in the bus market? Or what if it resulted in a price change in some other market, say the housing market?

p 139 The market for rail trips and tenancies is in Figures 10.2a and 10.2b. **Instead please use the figure from Blackorby and Donaldson 1999 on my webpage.** The discussion of pages 140-142 are drawn from Blackorby and Donaldson rather than Sugden and Williams. Both give the right result, but Sugden and Williams' argument is wrong. The Blackorby Donaldson figure is an example where the price of rail travel goes *down*.

p 140' There is a price *reduction* in the price of rail trips, which pushes demand *up* initially along Dr(pr,phb), where pr refers to the price of rail trips and phb refers to the price of housing before the rail price change. At first blush, we would integrate this demand curve and be done. However, we know that with more rail traffic, there will be greater demand for suburban housing, and the price for housing will rise to pha (price of housing after). But since tenancies and train trips are complements, this price rise pushes *down* the demand for train trips to Dr(pr,pha). Thus, the quantity demanded in the rail market will go from ra to rb, that is from point E on Dr(pr,phb) to point C on Dr(pr,pha) in this general equilibrium analysis.

p 140' What is consumer surplus in the rail market? There are two ways to start. Either do the

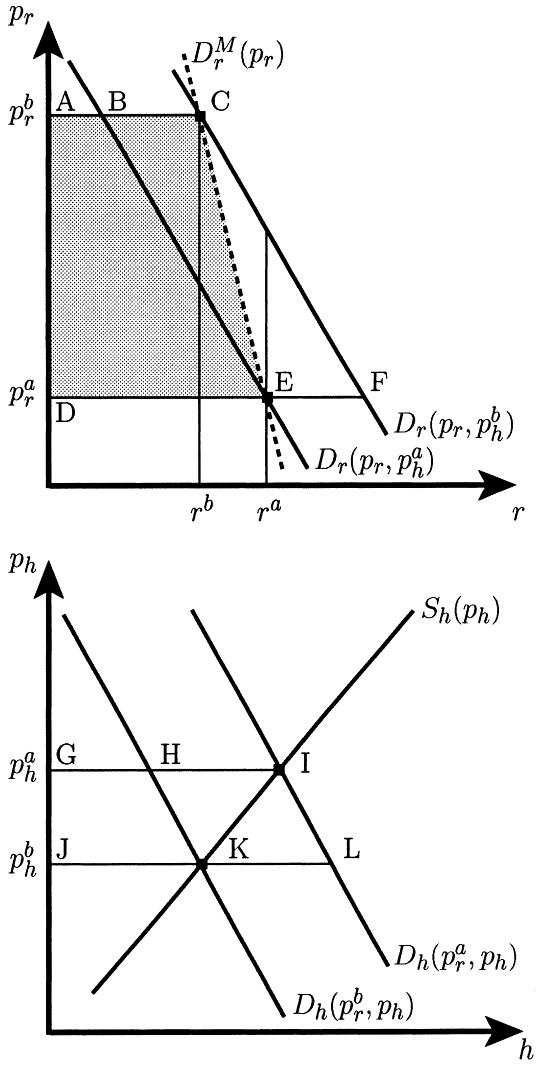

Fig. 1. Market demand curves and Dupuit–Marshall consumers' surpluses.

In general, these three numbers are not the same; in order for them to coincide, the consumers' surpluses must be *path independent*, a requirement that is not often satisfied.[1] If path independence is satisfied, the consumers' surplus is well defined for all price paths.

To prove the result mathematically, we define the Dupuit–Marshall consumers' surplus as a line integral along a continuous price path from (p_r^b, p_h^b) to (p_r^a, p_h^a) given by

[1]See Silberberg (1972), Chipman and Moore (1976) and Section 4.

rail market first, or the housing market first. If we do the rail market first, then we calculate gain to CS off of Dr(pr,phb) (because the housing price change hasn't passed through yet), and get ACFD. Then, we go to the housing market. The rail price has already dropped, so we get an increase in demand for housing which increases the price. We get the loss to CS off of Dh(pra,ph), which is GILJ,and a gain of PS of GIKJ, which yields a total surplus decrease in the housing market of ILK (CS loss exceeds PS gain). Thus, the total is ACFD minus ILK.

p 140' Alternatively, we start in the housing market. Here, the price goes from phb to pha, and we use the demand curve Dh(prb,ph) which uses the initial rail market equilibrium price. CS goes down by GHJK, but PS goes up by GIKJ, which yields excess PS in the housing market of HIK. Then, we go to the rail market, and compute CS off of the demand curve which uses the new housing price pha, Dr(pr,pha), yielding CS of ABED. Thus, the total change in surplus is ABED plus HIK.

p 142' Another approach is to use these two methods to sandwich the effect of a small part of the price change in the rail market. If we assume that HIK and ILK are small (due to their triangular nature), then we will add up CS in the rail market and move out the Dr curve at the same time, and the effect of the corrections HIK/ILK will be close to zero. Thus, we should add up the CS along a demand curve that goes from E to C, yielding CS of ACED.

p 142' This demand curve which gives Dr(pr)=Dr(pr,ph(pr)) gives the demand for trains at each pr,ph combination where *ph is ph resulting from pr in the general equilibrium*. Thus, in a demand system which excludes ph, it is the demand for rails given pr.

Issues so far:

1. Why should we care about consumer or producer surplus that does not accrue to a person? For example, if the project is 'raise the price of gas', we can estimate the loss in consumer surplus off of the marshallian demand curve, but why should we care about producer surplus—after all, firms aren't people.
    a. Firms are owned by people, and economic profits will be distributed to owners. Thus, producer surplus will end up in the hands of people, so we should count it. The distributional neutrality of 'sum of Cvs' allows us to ignore the incidence of that producer surplus.
    b. Aren't firms supposed to be competitive? How can there be an increase in economic profits in the market if there is free entry? If there is free entry and there are no increasing returns to scale, then the long run supply curve must be flat. If the long run supply curve is flat, then there is no change in producer surplus if the government raises the price of gas.
    c. Recall that standard cost benefit is not concerned with the distribution of surplus. Thus, the fact that capital owners are concentrated, so that economic profits accrue to the few is not important. That is why you can cancel out losses to CS with gains to PS.
2. The argument so far suggests that we can estimate consumer surplus by integrating the marshallian market demand curve, and use that consumer surplus measure to do social evaluation. That is, we should use market marshallian consumer surplus to order social states.
    a. market vs individual demand curves. Integrating demand curves requires

knowledge of their slopes, not their levels. Blackorby and Donaldson show in "Case Against..." that market demand curves have the same slopes as individual demand curves if and only if preferences are marginally identically quasi homothetic (MIQH):

i. $V_i(p, y_i) = a_i(p) + b(p)y_i$ which yields marshallian demand curves of the form $h_{ij}(p, y_i) = A_{ij}(p) + B_j(p)y_i$ where hij is the quantity of good j demanded by individual i.

ii. If MIQH is true, then integrating marshallian demands gives the same answer as integrating individual demands. If MIQH is not true, then they do not coincide.

b. marshallian vs hicksian consumer surplus. The textbook argues that marshallian consumer surplus measures are 'close enough' to hicksian (compensated) consumer surplus measures. To coincide exactly, there must be no income effects at all. That is, as we move a little bit up the marshallian demand curve to find a little bit of the CV, when we give that bit of CV to the consumer, they do not adjust their (marshallian) demand curve. Since income must be spent (free disposal), there must be income effects if we consider all goods.

c. consumer surplus quasi-orderings. The Boadway Paradox is that in an exchange economy constrained to allocations on the core (where all allocations are equally efficient by definition), every allocation weakly dominates every other allocation by the sum of CV measure. This is because each individual's CV is weakly greater than their income change when considering moving between allocations in the core.

i. The sum of CV is zero if relative prices are unchanged. In this case, CV=income change, and so since the sum of income is unchanged, the sum of CV is zero.

ii. CV is greater than income change if prices change. This is due to the concavity of the cost function in prices. If prices change, then there is something to be gained for each individual from substitution to (relatively) cheaper commodities.

iii. Blackorby and Donaldson show how this extends to a production economy. Cost functions are still concave, so people still have something to gain from substituting away from newly expensive goods.

iv. Thus, sum of CV is only a quasi-ordering over all allocations.

(1) If people do not have leiontief preferences (so that substitution is desirable), the sum of CV is a full ordering if and only if MIQH so that redistributing income has no effect on demands and therefore relative prices.

(2) If people do have leiontief preferences, then the sum of CV equals the sum of income changes and the ranking is by total income.

d. Consumer surplus quasi-orderings are not the same as potential pareto improvement orderings. The Boadway Paradox is a situation in which allocations are potentially pareto indifferent, but not ranked (due to reversals) by the sum of CV criterion. Potential pareto improvements all have positive sum of Cvs, but sometimes positive sum of Cvs does not correspond to a potential pareto improvement.

e. However, the potential pareto improvement criterion is also subject to reversals (called Scitovsky reversals), and so it, too, is a quasi-ordering over all allocations. Reversals occur in the production economy generalisation of the Boadway paradox, and they are again driven by substitution effects in consumption and production. The criterion gives a full ordering if and only if MIQH.

f. Potential Pareto Improvements may be undesirable. The potential pareto improvement criterion is distributionally blind. Distribution may matter.

g. General equilibrium effects may be included in models where the intervention market is not competitive but all other markets are competitive. In this case, one can use the consumer surplus from the intervention market evaluated along the demand curve which adjusts for GE effects (that is, the observed demand curve D(p0)=D(p0,p1(p0)) where p1(p0) is the general equilibrium p1 given each p0). Producer surplus is just the change in government revenue (evaluated at average prices). Effects from all other markets are included via their price effects in D(p0).

3. So, if MIQH is satisfied, sum of CV is identical to the potential pareto criterion and yields an ordering over all social alternatives. Further, if MIQH is satisfied, then there is an aggregate consumer and market demands may be used to construct the individual CV measures. However, integrated marshallian demands do not equal integrated hicksian demands. If there exists an aggregate consumer, then the hicksian demand curve may be computed from market marshallian demand curves by adjusting income with each compensation. Finally, general equilibrium trick noted above satisfies path independence if and only if MIQH is satisfied *and* the sum of the intercepts is zero (so that the aggregate consumer is homothetic).

   a. MIQH with a homothetic aggregate consumer plus competitive markets in all but the intervention market yields and environment where cost benefit analysis is internally consistent and gives a full ordering over social alternatives.

   b. If MIQH doesn’t hold, then you have to worry about inconsistencies in rankings and non-ranked alternatives. If the general equilibrium is not characterised by pure competition in all markets except the intervention market, then you have to worry about complicated price feedbacks and so on.

4. Cost benefit analysis offers a set of short-cuts to the positive and normative analysis of ordering social alternatives.

   a. The positive short-cuts are

      i. Ignore all general equilibrium feedbacks through the price mechanism, so that partial equilibrium analysis of surplus is sufficient, or consider an environment where the general equilibrium feedbacks are simple (such as perfect competition in all but one market).

      ii. Use marshallian surpluses which ignore income effects.

      iii. Ignore reversals and non-ranking of social alternatives, or consider an environment where such reversals don’t happen (MIQH).

   b. The normative shortcuts are

      i. Treat surplus as a measure of individual welfare change.

      ii. Ignore the distribution of surplus.

5. There is scope for improvement on all of these fronts.
   a. Improvements in positive economics:
      i. Model general equilibrium feedbacks with computable GE models that take such feedbacks seriously.
      ii. Estimate hicksian (compensated) surpluses with estimable demand systems.
      iii. Use an aggregator not subject to reversals, for example, functions of utilities.
   b. Improvement in normative economics:
      i. Use a measure of welfare or welfare change which is more sensible, such as money metrics, welfare ratios, or utilities.
      ii. Aggregate measures of welfare or welfare change in a sensible fashion, for example with utilitarian or generalised utilitarian aggregators.

Chapter 11: Individual Valuation of Unmarketed Goods

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