Why public goods are a pedagogical bad

Frances Woolley

Department of Economics
Carleton University
1125 Colonel By Drive
Ottawa, ON K1S 5B6

I would like to thank the Social Sciences and Humanities Research Council for providing funding for this project, David Long, Nick Rowe, Linda Welling and participants at the SEPP Brown Bag Seminar for helpful discussions, and Bill Snow for research assistance.

Abstract

The concept of "public goods" is confusing because it confounds three analytically distinct concepts: excludability, rivalry, and public finance. Pure public goods are of limited relevance as an explanation of government spending. To make matters worse, the broader policy community uses the term in ways that invoke different means of both "public" and "good" than economists favour. For example, "global public goods" describe everything from the global environment, international financial stability and market efficiency, to health, knowledge, peace and security and humanitarian rights. In this essay, I argue for radically reducing the emphasis placed on public goods in the standard undergraduate public finance curriculum, and instead emphasizing the fundamental underlying issues of exclusion, rivalry, and public finance/provision. The ultimate aim of an undergraduate course in public expenditures should, I argue, be to explain government spending.

Why public goods are a pedagogical bad

What's the difference between national defence and pizza?

Rosen, Dahlby, Smith and Boothe (2003, p. 52)

If asked to think about it, most economists would probably agree with some basic pedagogical principles. *Explain one thing at a time, not two things at once.* For example, we explain the concept of supply separately from the concept of demand. *Begin with basic concepts, and work upwards.* For example, we explain the ideas of supply and demand before explaining the notion of market equilibrium. *Ground teaching in reality; be concrete and specific* - hence the number of examples about pizza in undergraduate textbooks (e.g. the quotation above, or Bruce, 1998: 66).

The standard undergraduate public economics (expenditures) course begins with a brief overview of government spending and a review of the fundamental theorems of welfare economics, and then goes on to discuss two paradigmatic cases of market failure: public goods and externalities (see, for example, Rosen, 1992, Stiglitz, 1986, Leach 2004, Myles 1995, Holcombe, 2006), before moving onto other topics. Public goods are typically, although not always, defined as those that are non-excludable, that is, "to prevent anyone from consuming the good is either very expensive or impossible" and non-rival "once it is provided, the additional resource cost of another person consuming

the good is zero" (Rosen, Dahlby, Smith and Boothe, 2003, p. 52). Non-excludability means that it is not possible to prevent people from consuming the public good; non-rivalness means that it is not desirable, from the point of view of economic efficiency, to prevent people from consuming the good. If it costs little or nothing to provide a consumer with the good in question, then as long as the consumer receives some benefit from consuming the good, it is efficient to allow her to do so.

Public goods are, in some sense, taken to be the paradigmatic case of public expenditures: "just as analysis of pure competition yields important insights into the operation of actual markets, so the analysis of pure public goods helps us to understand problems confronting public decision makers." (Rosen et al., 2003, p. 53). Non-rivalry creates the problem of public finance: how to pay for goods that, from a point of view of economic efficiency, should be provided at low cost or free or charge, because the marginal cost of an additional user is (close to) zero. Non-excludability can be thought of as the problem of definition and enforcement of property rights: how to make agents take account of the effect their actions on others.

The public goods discussion violates the first basic pedagogical principle: explain one thing at a time. Confounding rivalry and excludability, it attempts to teach these two analytically, empirically and economically different concepts together. The problem of public finance and the problem of the definition of property rights are confounded into one lecture, one chapter, what seems to be one idea. Moreover, to the extent that the pure public goods discussion ignores goods that are rival but non-excludable, or goods that are non-rival but excludable, the implications of rivalry or excludability are not fully

discussed. Hence the second pedagogical principle, begin with basic concepts and work upwards, is violated.

Finally, the concept of public goods is not grounded in reality. The concept of excludability, as defined in public goods textbooks, is based on technology, that is, whether or not it is technologically feasible to exclude those who do not pay from using the good. However technological feasibility is a hypothetical construct. For example, the streets of New York are excludable if it is hypothetically possible to require people to pay a toll in order to drive a car in Manhattan. A few years ago, many might have agreed such a charge was infeasible; the successful introduction of the London congestion charge suggests that it is not. Because actual exclusion is so much easier to conceptualize than hypothetical excludability, students and others tend to assume, incorrectly, that goods supplied free of charge by government, such as (in many countries) health care, bridges or education, are public goods. Non-excludability is confounded with public finance.

Most publicly-funded health care treatments (pharmaceuticals, chemotherapy, hip replacements, and so on) in wealthy countries are not "public goods" as economists use the term because it is easy, from a technological point of view, to deny people access to, say, coronary-bypass surgery. Toll-booths can be erected on bridges. For education, too, it is straightforward to deny people access (and, in any event, education is, like health care, rival). Yet the confusion between the theoretical concept of public goods and the notion of public, free provision has a long history in the literature. The classic paper on public goods, Samuelson (1954), is "The pure theory of public expenditure." It

formalized what is now known as public goods theory as a way of explaining public expenditure. The two have been confounded ever since.

The concept of public goods has in it several sources of confusion. Yet the idea of comparative advantage takes some time to comprehend, and we teach it anyways, because it provides fundamental insights into the working of the economy. In the remainder of this essay I will argue that public goods theory provides a highly incomplete explanation of actual government spending, and fails to tell us how governments can provide so-called public goods - why governments can succeed where markets fail. I will call, therefore, for a radical restructuring of the public economics curriculum.

1. The theory of public goods does not explain government spending

If the aim of a basic public finance course is to explain government spending, it is difficult to argue that public goods deserve the attention they get. As many textbook writers openly acknowledge, "It is difficult to think of many examples of really pure public goods." (Rosen et al., 2003, p. 53) Surveying the texts, one finds reference to military establishments and the administration of justice (Musgrave, 1959, pp. 43-44), volunteer fire departments, private charity, national defence and police protection (Hyman, 1983, p. 149), parks, fire and police protection, defence and lighthouses (Leach, 2004, p. 168), public health, fire departments and national defence (Stiglitz, 1986, p. 100), provision of fluoride in the water supply (Prest, 1970), fireworks (Rosen, Dahlby, Smith and Boothe, 2003), defence and the exploration of outer space ("two very important examples" - Tresch, 2002: 171) and so on.

Many of these goods, however, can be thought of as public only when they are viewed as abstractions, as in 'law and order' The goods and services that go into creating 'law and order' are not themselves pure public goods: access to the courts is rival. The explosion of gated communities and private security firms is evidence of the excludability and rivalness of police protection. Fire protection is, from a technological point of view, excludable (the fire department can refuse to put out your fire if it chooses). Coase (1974) argued that lighthouses were, historically, often privately provided and financed, and changing navigational technology is making them obsolete. Parks are partially excludable (permits are required for hiking and camping at many national parks, for example).

So-called 'national defense' expenditures are more complex. While pure deterrence is a public good, much of military spending is not. A war may or may not be a 'public good'. Conventional defense is rival in that troops cannot be in two places at the same time. Even with a program that seems close to being a pure public good, the ballistic missile defense initiative, there is still the question: "*Qui bono*?" Who gains? Any rents (that is, excess profits) suppliers enjoy from defense procurement contracts are not public goods. In general, while peace and security is a public good, there is room for debate about the precise relationship between military spending and peace and security.

More recently, attempts have been made to salvage public goods theory by arguing that income redistribution is a public good (see Leach 2004 for a textbook treatment). The idea is that, if many people care about Lois, transferring income to Lois will provide benefits to many people - all those who care about her. Those benefits are non-rival (the joy I receive from seeing Lois better off does not diminish the joy you

receive), and non-excludable (you cannot prevent me from feeling happy about Lois's improved fortunes). If one is prepared to accept the basic premise of the argument, that everybody cares about other people, it does give some reason for viewing income redistribution as a public good. However, as I will argue below, there are better explanations of income redistribution.

Without income distribution as a public good, one might be forced to conclude, as Prest did thirty-five years ago, "It can be argued that goods exhibiting both of the relevant characteristics - non-rivalness in consumption and non-excludability - are likely to be few in number" (Prest, 1970, p. 66). As shown in Table 1, the "good governance" public goods - the legislative and judicial aspects of government - account for a minimal fraction of US federal government spending. Administration of justice represents two percent of US federal expenditures. Space exploration accounts for one percent, and so on. National defence – at 20 percent of US federal government expenditures – is one substantial part of public expenditure explained by public good theory, if one is willing to grant that the Iraq war is a public good. However in the US, as elsewhere, most public expenditure goes towards redistributive transfers, health and education. Table 2 shows total government expenditures for 18 OECD countries. Most government expenditures go towards health (7 to 19 percent of government spending), education (7 to 15 percent), and 'social protection' programs that more directly redistribute income (19 to 45 percent). The goods most often cited as public goods are unimportant in terms of overall government expenditure for OECD countries: defense accounts for 1 to 6 percent of spending; public order between 2 and 5 percent of spending. This is not to say that the role of government in providing law and order is unimportant. Rather these so-called

public goods do not give us 'a theory of public expenditure' simply because they do not involve much spending.

2. Theoretical precision, practical confusion

In 1954 Samuelson provided a precise mathematical formulation for the theory of what came to be known as public goods, building on earlier, more intuitive formulations by Wicksell, Lindahl and Musgrave. Samuelson specifies a "collective consumption good" as one that "all enjoy in common in the sense that each individual [i]'s consumption of such a good [X_{n+j}] leads to no subtraction from any other individual's consumption of that good, so that $X_{n+j}=X^{i}_{n+j}$ simultaneously for each and every ith individual and each collective consumption good."

The pedagogical problem is how to make this theory meaningful to an undergraduate; to find examples to make the theory relevant, and give a non-technical, intuitive explanation of Samuelson's definition. The most common solution to the problem is by means of a table such as Table 3 below, a variant on one produced by in various editions of Musgrave and Musgrave, or in principles textbooks such as Mankiw, MacKenzie, Kneebone and Rowe (2002). Sometimes the table is replaced by a diagram, showing a continuum of goods varying in their degree of rivalry or exclusion. Pure private goods are ones that are both rival and excludable, shown in the top left hand corner, pure public goods are both non-rival and non-excludable, and in the bottom right. The other two boxes are filled by common property resources, which are rival and non-excludable, and by natural monopolies, toll goods or many informational goods are non-

rival and excludable.[1] Externalities are not shown in Table 3 because they span a wide range of situations. Externalities arise from non-excludability - if one accepts the premise of the Coase theorem, that with clearly defined property rights, externalities can be internalized. The depletion of a common property resource, one from which no one is excluded, creates externalities. However externalities frequently arise because one person's actions affect another person, that is, the actions are in some sense non-rival. So a pure public good is a special type of externality.

Anyone who has been teaching from a textbook such as Rosen or Stiglitz for years may be surprised to learn that there is not, in fact, a consensus among public finance economists on how public goods are defined: are they goods that are non-rival, or goods that are non-excludable, or both? Musgrave, Musgrave and Bird (1987) define "social goods" entirely in terms of non-rivalry (p. 45). (The "social goods" language has an additional advantage of avoiding confusion between "public goods" and "publicly provided goods"). Non-rival excludable goods are considered to be social goods, but unimportant "although the features of non-rival consumption and non-excludability need not go together, they frequently do." (p. 45).

By way of contrast, Tresch (2002) defines what he calls "non-exclusive goods" entirely in terms of non- excludability. A public good is merely a special form of externality. For example, referring to Samuelson's classic public goods paper he describes it as "the special problems caused by nonexclusive goods, Samuelson chose the nonexclusive good for his example of an externality" (p. 171). Formally, Tresch has a

[1] Some goods fit somewhere between different categories. For example, club goods, such as tennis clubs or fitness clubs, are goods that are partially rival and partially excludable.

point. Samuelson's mathematical formulation, described above, applies equally well to non-exclusive goods as to non-rival goods.

After reading this section, a public finance instructor may be as confused as an average public finance student: are these goods social goods, public goods, nonexclusive goods or collective consumption goods? Are they non-rival, non-exclusive, or both? The problem with the Musgrave and Musgrave view of public goods as non-rival goods is that it does not give "A Theory of Public Expenditures". Many non-rival and excludable goods are privately provided - at times reasonably efficiently -- through, for example, satellite radio broadcasts, private toll roads, fitness clubs. In the years since Musgrave and Musgrave first wrote, economists have increasingly realized that governments, like markets, can fail. The taxes necessary to finance public goods are themselves distortionary. Governments, like private firms, do not necessarily have 'the necessary information' about people's demand functions to provide public goods at efficient levels. Without non-exclusion there does not seem to be a compelling role for government provision, that is, there is no 'public' in 'public goods'. The general consensus seems to be that it is better to restrict public goods, and hence the a priori case for government intervention, to goods that are both non-rival and non-excludable.

What about the view that is implied by Tresch's (2002) argument? If Samuelson's theory is simply one of non-exclusive goods, perhaps we can do away with the notion of public goods altogether, and focus solely on the concept of externalities?

3. The relationship between public goods and externalities

That there is little difference between externalities and public goods has long been recognized. For example, Laffont (1989: 33) writes "the difference between a public good and an externality is subtle" but then fails to explain precisely what that difference is. Musgrave, Musgrave and Bird (1987: 66) note that negative externalities can be thought of as, in a parallel to public goods, social "bads".

More generally, if a public good is provided for one person, the benefits that everyone else gets from that public good can be thought of as a positive externality. To see a simple proof of the relationship, note that the standard Samuelson condition for the efficient level of public goods provision,

$\Sigma MRS_i = MRT$

can be re-written as

$MRS_i + \Sigma_{j \neq i} MRS_j = MRT$

The provision of a public good to person i can be seen as something that produces a private benefit for person i and positive externalities for everyone else. The efficient level of provision is the same in both cases. Parsimony and simplicity suggest that it is better to explain non-excludable goods with one theory rather than two. A number of other considerations argue for making that one theory the theory of externalities, rather than the theory of public goods.

Textbook writers often appear to be strained when motivating the notion of public goods, repeating with what seems almost like embarrassment the same tired examples of lighthouses and so on. The theory of externalities is a sharp contrast. As Leach (2004: 99) puts it "Once you start looking, externalities are everywhere." He lists, with enthusiasm, eleven examples, from the standard example of smokers infringing on the

comfort of non-smokers to traffic congestion and the problem of drug resistance from the over-use of antibiotics. This is the first reason it is better to teach students about externalities: concrete, specific, relevant examples of external effects are easy to come by. Yet there are others.

The theory of externalities is much more general in terms of the range of situations it covers: it encompasses both positive and negative effects; rival goods (the commons) and non-rival goods (vaccinations). While a pure public good can easily be modeled as an externality, the reverse is not true. For example, lithium batteries create negative externalities – the health hazards associated with release of lithium into the environment and the cost of safe disposal (assuming that disposal costs are not internalized). These can be explained in public goods terms if one abstracts from the specific situation and models 'health' or 'the environment' as a public good which is reduced by battery production. It can be done, but by introducing abstract concepts that add a layer of complexity with no real added benefit in terms of understanding.

Indeed, in general, the theory of public goods lends itself to abstraction -- commonly cited public goods of national defense, income redistribution, peace, security, good government – all are abstract concepts. Externalities can be abstract too, such as pollution, but as often they are concrete – the amount of pollution produced by a particular factory in a particular time and place. The concrete and specific nature of externalities is another reason why it is a better theory to teach.

The theory of externalities is also more general in terms of the rich variety of remedies found within the theory. One remedy for positive externalities is government subsidies (see, for example, Rosen et al., 2003). The insights offered by public good

theory – that an efficient level of public goods provision can be attained when the good is financed by government – can also be derived by the theory of externalities. However, externality theory offers so much more.

Public goods theory (usually) assumes non-exclusion, thereby *assuming away* a rich array of remedies for market failure. Since the work of Ronald Coase, externality theory has questioned whether any good must be non-excludable. The theory asks "is there some way of inducing people to take the effect of their actions into account through the price mechanism?" Rather than understanding, say, London roads as an impure public good and bemoaning their congestion, the idea of assigning property rights asks 'is there a way to make people pay for use of the roads and achieve efficiency?' It turns out there was, and the London congestion charge has been wildly successful.

4. The cost side

Public goods theory is not without merits, and one of its strengths is that it draws attention to the structure of costs. Perfect competition assumes that, for the nth good X_n, the marginal cost of an additional user i is the same as the marginal cost of producing an extra unit of the good, that is,

$$C(X^i_n,X^j_n)= X^i_n+X^j_n$$

Public goods theory considers the case where the cost of producing the good is equal to the maximum consumed by any one individual:

$$C(X^i_n,X^j_n)= \max[X^i_n,X^j_n] \qquad (1)$$

Both are special cases of a more general cost function:

$$C(X^i_n,X^j_n)= F(X^i_n,X^j_n)$$

Figure 1 shows isocost lines for two individual's consumption of public and private goods (these curves are similar to those found in Atkinson and Stiglitz, p. XXX), as well as the intermediate case. The consequences of this more general formulation of costs have yet to be fully explored.

Pure non-rivalry, as in equation 1 above, implies low or zero marginal costs for additional users of a good. This is a crucial, general and pervasive form of departure from perfect competition, and can be understood using theoretical insights from the literature on monopolistic competition, oligopoly and monopoly theory. Yet the insights of these theories are not necessarily those hypothesized by public goods theory. The theory of imperfect competition suggests there will be excessive amounts of investment in the fixed costs of production (for example, investments in research to create copy-cat pharmaceuticals, i.e. drugs that perform the same function as other drugs currently on the market). The appropriate role of government is in correcting the tendency of firms to monopolize the market, restrict output and raise prices. Unfortunately, the possibility of excessive investment is largely ignored, and role of government in regulation of monopoly and pricing is downplayed, in most undergraduate public economics texts.

Downplayed, too, is discussion of the nature of costs in the public sector. To return to the question asked by Rosen, Dahlby Smith and Boothe (2002): "What's the difference between national defence and pizza?" One answer is: I know how to produce a pizza, and a given quantity of flour, water, yeast salt and sugar will always yield a predictable quantity of pizza dough. The relationship between a million dollars worth of military spending and deterrence is much less clear-cut: it is almost impossible to know precisely how much safer the country is as a result of, say, the purchase of a nuclear

missile. Samuelsonian public goods theory teaches us that the optimal level of public goods provision occurs when the sum of the marginal rates of substitution between public and private consumption is equal to the marginal rate of transformation. Yet this is of little use if cannot estimate the production function, that is, we do not know the relationship between the inputs of, say, dollars spent on foreign aid and the output of, say, (global) social justice.

5. Why has the concept of public goods remained so popular?

Holcombe (2006: 100) points out that the public goods terminology "can be confusing because so many different things are called public goods by economists." So why do we keep using such a confusing piece of terminology?

Even those who, like Holcombe (2006), try to veer from the consensus view, replacing the term public goods with 'collective consumption goods' face a further obstacle: Academic publishers wish to appeal to the widest possible audience. As long as there is a perception that the average public economics instructor wants a chapter called 'public goods,' textbooks will include such a chapter, even if, as in Holcombe's case, the text of the chapter deals with 'collective consumption'. I would argue that most instructors want their students to know the core concepts of public economics. As long as everyone else accepts that public goods are one of those standard core concepts, it is difficult for any one person to change the undergraduate curriculum – a classic collective action problem.

A second reason is that the very ambiguity of the term 'public goods' gives it political purchase. Consider, for example, UN Secretary-General Kofi Annan on global public goods:

> It is not beyond the powers of political volition to tip the scales toward a more secure peace, greater well-being, social justice, and environmental sustainability. But no country can achieve these global public goods on its own, and neither can the global marketplace. Thus our efforts must now focus on the missing term of the equation: global public goods. (Source: http://www.undp.org/globalpublicgoods/)

To call these public goods somehow seems to imply that they are 'good' as in good, desirable things, and 'public' in that there is a role for public involvement (Long, 2006, provides an extended analysis, and I will not develop the point further here). The rhetorical and persuasive power of the term 'public good' suggests it will continue to be used in policy circles.

A final, and perhaps more interesting reason, why interest in public goods has grown rather than abated in recent years is that public goods theory appears to offer the promise of turning equity arguments into efficiency ones. Consider, for example, the case of income redistribution. Ten or twenty years ago, many economists might feel comfortable arguing for income redistribution on the basis of economic justice, that is, hypothesizing the existence of a social welfare function, perhaps utilitarian, perhaps Rawlsian. The social welfare function in some sense represented the interests or welfare of society as a whole. Income redistribution was justified on the grounds that, by taking money from people with a lower marginal utility of income and giving it to those who had a higher marginal utility of income, overall social welfare would be increased.

Social welfare arguments are often criticized today for resting on particular value judgments or interpersonal utility comparisons. If we see income redistribution as a public good, however, such value judgments can be avoided – it is not that society as a whole wants income redistribution, it is that individual people within society want income redistribution, but are unable to achieve it because of the difficulty of collective action. The weakness of the income redistribution as a public good argument, however, is that the empirical evidence that people have some intrinsic natural concern with others is weak. Adam Smith in *A Theory of Moral Sentiments* puts the case this way:

> Let us suppose that the great empire of China, with all its myriads of inhabitants, was suddenly swallowed up by an earthquake, and let us consider how a man of humanity in Europe, who had no sort of connexion with that part of the world, would be affected upon receiving intelligence of this dreadful calamity. He would, I imagine, first of all, express very strongly his sorrow for the misfortune of that unhappy people, he would make many melancholy reflections upon the precariousness of human life, and the vanity of all the labours of man, which could thus be annihilated in a moment.
>
> He would too, perhaps, if he was a man of speculation, enter into many reasonings concerning the effects which this disaster might produce upon the commerce of Europe, and the trade and business of the world in general. And when all this fine philosophy was over, when all these humane sentiments had been once fairly expressed, he would pursue his business or his pleasure, take his repose or his diversion, with the same ease and tranquillity, as if no such accident had happened. The most frivolous disaster which could befal himself would occasion a more real disturbance. If he was to lose his little finger to-morrow, he would not sleep to-night; but, provided he never saw them, he will snore with the most profound security over the ruin of a hundred millions of his brethren, and the destruction of that immense multitude seems plainly an object less interesting to him, than this paltry misfortune of his own…[2]

[2] Available at http://www.adamsmith.org/smith/tms/tms-p3-c3a.htm accessed May 10, 2006. Quotation is from Part III, chapter III. Later in the same chapter we find that Smith's lack of sympathy applies to the poor in his own country also: "The mere want of fortune, mere poverty, excites little compassion. Its complaints are too apt to be the objects rather of contempt than of fellow-feeling. We despise a beggar; and, though his importunities may extort an alms from us, he is scarce ever the object of any serious commiseration. The fall from riches to poverty, as it commonly occasions the most real distress to the sufferer, so it seldom fails to excite the most sincere commiseration in the spectator."

Smith goes on to argue that the concern we feel for others is a "moral sentiment." It is not something intrinsic or natural, but a value.

To be more formal about it: Income redistribution is a public good all individuals have a utility function :

$U=U(x_1, x_2,\ldots,x_n)$

Where x_i is the consumption of the ith individual. This would seem to make income redistribution an issue of efficiency, that is, everyone can be better off if income is redistributed in such a way as to increase everybody's utility. However even if we have a more optimistic view of people's caring for their fellow travelers than Smith did, we still do not know anything about the form of the individual utility function. Rather than debating the nature of the social welfare function, we must debate the form of the individual utility function.

Suppose, for the sake of argument, that an individual's preferences over his or her own personal consumption are represented by $U_i(x_i)$, and his level of well-being (which includes the value he places on his own consumption and his altruistic concern for others) is given by

$W_i= \alpha_1^i U_1 (x_1)+ \alpha_2^i U_2 (x_2)+\ldots+ \alpha_n^i U(x_n)$ where $\Sigma_i \alpha_j^i=1$ for all j.

In this case, the Samuelsonian conditions for the optimal level of public goods provision – viewing each individual's consumption as a public good – are equivalent to the amount of income redistribution required by a utilitarian social welfare function. Optimality requires equalizing marginal utilities of income. On the other hand, we might also assume (somewhat less plausibly) that each individual's utility function is of the form:

$U_i= \text{Min}[U_1 (x_1), U2 (x_2),\ldots,U(x_n)]$

In this case, public goods theory suggests a Rawlsian approach to redistribution.

Seeing income redistribution as a public good does not eliminate the need to make some sort of judgment about how much income redistribution is desirable. It merely changes the way we describe the problem from being a "value judgment" to a "preference revelation problem".

The income-redistribution-as-public-good argument has, therefore, two problems: preference revelation, and the lack of convincing empirical evidence that people's concern for others is sufficiently strong to explain income redistribution on the scale experienced by most developed countries. Fortunately, however, there are equally compelling theories of income redistribution. Social Security, for example, can be plausibly viewed as a form of insurance (insuring against poverty in old age); it can be explained using a public choice model where politicians redistribute income to increase their electoral success (vote buying). It might be motivated by a benevolent government maximizing social welfare or promoting economic justice. Alternatively, income transfers can thought of as something that primarily benefits the recipient, but creates positive externalities for others. Talking about income redistribution in terms of equity or in terms of politics seems to me to be much more intellectually honest.

The problem with describing anything – such as income redistribution or national defense or peace or justice or good governance – as a public good is that such concepts are basically abstractions. Returning to the initial quote: what is the difference between national defence and pizza? I know how much I am prepared to pay for pizza. I do not know how much I am prepared to pay for environmental sustainability or social justice and, because pure public goods are by definition non-excludable, market mechanisms

will never reveal that willingness to pay. Despite the development of a large theoretical literature on preference revelation mechanisms, the practical problem of preference revelation has yet to be solved.

Perhaps "It is not beyond the powers of political volition" for governments to act together to provide global public goods. However the really interesting question is how can governments overcome the lack of knowledge about both the costs and benefits of producing public goods, transcend free-riding tendencies, and provide goods that their citizens value.

6. There is still a room for the public goods concept

The theory of public goods does have value. But not, however, in explaining government. Public goods theory offers rich understanding of the theory of small group interactions. I have used it in my own work on modeling the family (Chen and Woolley, 2001). Bilodeau and Slivinski (1996) show the value of public goods theory in understanding toilet cleaning and department chairing. While goods that are pure public goods for an entire economy are rare, it is not difficult to think of goods that, within a household or other small group, have substantial public aspects, and the theory of public goods gives considerable insight into free-riding and other problems of collective action in small group settings. I do not wish to denigrate the value of such research. But the point is, it does not explain government spending, and one might think that would be the main point of undergraduate public finance.

7. Where to go from here.

In *The Wealth of Nations,* Adam Smith argued that the upkeep of highways should be carried out by government. His reasoning was completely different from a contemporary public goods analysis:

> The tolls for the maintenance of a high road cannot with any safety be made the property of private persons. A high road, though entirely neglected, does not become altogether impassable, though a canal does. The proprietors of the tolls upon a high road, therefore, might neglect altogether the repair of the road, and yet continue to levy very nearly the same tolls. It is proper, therefore, that the tolls for the maintenance of such a work should be put under the management of commissioners or trustees.[3]

The market failure identified by Smith is, essentially, a hold-up problem, that is, a problem of parties to a contract making insufficient investments after a contract hs been signed. The modern solution to the hold-up problem is design of appropriate contracts and incentive mechanisms, as well as monitoring (as in commissioners or trustees). One can argue that sometimes that monitoring might most effectively be done by a form of organization called 'government.'

If we designed our public economics courses with the aim of explaining government spending, they would look quite different. They might start, as does Barr (1987), with discussions of risk, uncertainty, and insurance, and the reasons why private insurance markets fail - moral hazard and adverse selection. Alternatively, one could take a public choice approach, beginning with the premise that politicians and voters are rational, self-interested agents, and explaining government expenditures as the result of politicians and voters interactions. Or one could begin with the political philosophy of

[3] Accessed on-line at http://www.adamsmith.org/smith/won/won-b5-c1-article-1-ss1.html. Quotation taken from *Wealth of Nations* Book 5, Chapter 1, Article 1.

income redistribution. Any of these starting points would explain a greater portion of government spending than the public goods paradigm.

Likewise, substantial insights into the economics of non-rival goods can be gained from the analysis of clubs (for providing local goods that are non-rival but excludable), the theory of natural monopoly (for goods such as Microsoft office where there are substantial initial development costs but the additional cost of an extra Word user is (close to) zero), or the economics of information (for the development of new technologies or drugs, where the manufacture of the new drug may cost a dollar or two per user, making it close to non-rival but the drug development may cost millions). While it is interesting and useful to have a theory for the special sub-set of non-rival goods that happen to be non-excludable also, there too few such goods to justify the place such goods hold in the public economics curriculum.

We are unlikely to be able to teach our students how to achieve peace, social justice, and environmental sustainability. What we can do, however, is set them along the right path. Much government intervention in the economy takes the form of income redistribution or social insurance. Students need to understand the economic rationale for each. Markets can fail when goods are non-rival or non-excludable, and this creates a possible niche for government. But governments have to be understood as agents with their own interests, sometimes selfish ones. And governments, like anyone else, need to overcome information problems and free-riding tendencies in order to succeed where the market fails.

It is easy to add demand curves vertically to find the efficient level of public goods provision. Understanding the real world is more complex and difficult - but ultimately much more fun.

References:

Atkinson, Anthony B and Joseph Stiglitz. 1980. *Lectures on Public Economics* London: McGraw-Hill.

Barr, Nicholas. 1987. *The Economics of the Welfare State* London: Weidenfeld and Nicolson.

Bilodeau, Marc and Al Slivinski. 1996. "Toilet cleaning and department chairing: Volunteering a public service" *Journal of Public Economics* 59(2): 299-308

Chen, Zhiqi and Frances Woolley. 2001. "A Cournot–Nash Model of Family Decision Making." *The Economic Journal* 111 (474), 722-

Coase, Ronald. 1974. "The Lighthouse in Economics" *Journal of Law and Economics* 17(2): 357-76

Holcombe, Randall. 2006. *Public Sector Economics: The Role of Government in the American Economy* Upper Saddle River, NJ: Prentice-Hall.

Hyman, David N. 1983. *Public finance : a contemporary application of theory to policy* Chicago : Dryden Press

Laffont, Jean-Jacques (translated by John P. bonin and Helene Bonin). 1989. *Fundamentals of Public Economics.* Cambidge and London: The MIT Press.

Leach, John. 2004. *A Course in Public Economics* Cambridge: Cambridge University Press.

Mankiw, G., K McKenzie, R Kneebone and N Rowe. 2002. *Principles of Microeconomics, 2nd edition* Thompson-Nelson.

Musgrave, Richard. 1959. *The theory of public finance; a study in public economy.* New York: McGraw-Hill.

Musgrave, Richard, Peggy Musgrave and Richard Bird. 1987. *Public Finance in Theory and Practice* Toronto: McGraw-Hill Ryerson.

Myles, Gareth. 1995. *Public Economics* Cambridge; New York: Cambridge University Press.

Prest, Alan R. 1970. *Public finance in theory and practice* London, Weidenfeld and Nicolson.

Rosen, Harvey S., Bev Dahlby, Roger Smith and Paul Boothe. 2003. *Public Finance in Canada, Second Canadian* Edition Toronto: McGraw-Hill Ryerson.

Rosen, Harvey S. 1992. *Public Finance*, Third Edition Homewood Il and Boston, MA: Irwin.

Samuelson, Paul. 1954. "A pure theory of public expenditures" *Review of Economics and Statistics*.

Smith, Adam. 1759. *The Theory of Moral Sentiments* searched on-line at http://www.adamsmith.org/smith/tms/tms-index.htm

Smith, Adam. 1776. *The Wealth of Nations* searched on-line at http://www.adamsmith.org

Stiglitz, Joseph. 1986. *Economics of the Public Sector* New York: Norton.

Tresh, Richard W. 2002. *Public Finance: A Normative Theory*, Second Edition Amsterdam; Boston: Academic Press.

Table 1: Public Expenditures in United States
(by function as the percentage of total public expenditure)

	2000	2001	2002	2003	2004
National defense	16	16	17	19	20
Human resources	62	64	66	66	65
Education, training, employment, and social services	3	3	4	4	4
Health	9	9	10	10	10
Medicare	11	12	11	12	12
Income security	14	14	16	15	15
Social security	23	23	23	22	22
Veterans benefits and services	3	2	3	3	3
Physical resources	5	5	5	5	5
Energy	0	0	0	0	0
Natural resources and environment	1	1	1	1	1
Commerce and housing credit	0	0	0	0	0
Transportation	3	3	3	3	3
Community and regional development	1	1	1	1	1
Net interest	12	11	9	7	7
Other functions	6	6	6	6	6
International affairs	1	1	1	1	1
General science, space and technology	1	1	1	1	1
Agriculture	2	1	1	1	1
Administration of justice	2	2	2	2	2
General government	1	1	1	1	1
Undistributed offsetting receipts	-2	-3	-2	-3	-3
Total, Federal outlays	100	100	100	100	100

Source: *Budget of the United States Government, Fiscal Year 2006*: Historical Tables. http://www.gpoaccess.gov/usbudget/fy06/hist.html. Accessed as of Oct.18, 2005.

Table 2:
Public Expenditures in 18 OECD Countries
(by function as a percentage of total public expenditure)

	1	2	3	4	5	6	7	8	9	10	Total
Austria	15	2	3	10	1	2	13	2	11	42	100
Belgium	20	2	3	9	1	1	13	2	13	35	100
Denmark	14	3	2	7	0	2	10	3	15	45	100
Finland	12	3	3	10	1	1	13	2	13	42	100
France	13	5	2	9	2	2	16	2	11	39	100
Germany	13	2	3	8	1	2	13	1	9	46	100
Greece	23	6	2	10	1	1	7	1	7	43	100
Iceland*	5	0	4	15	0	2	19	6	15	19	100
Ireland	11	2	4	15	0	6	19	2	13	28	100
Italy	19	2	4	8	2	0	14	2	10	38	100
Japan	8	3	4	13	5	2	19	0	12	34	100
Luxembourg	11	1	2	12	3	2	11	4	11	42	100
Netherlands	17	3	3	11	2	3	9	2	10	38	100
Norway	11	4	2	10	1	1	16	2	13	38	100
Portugal	14	4	4	11	1	2	15	3	15	30	100
Spain*	14	3	5	11	2	3	14	3	11	34	100
Sweden	15	4	3	8	1	2	12	2	13	41	100
UK	10	6	5	6	1	1	16	1	13	40	100

Notes:
1 General public services
2 Defence
3 Public order and safety
4 Economic affairs
5 Environment protection
6 Housing and community amenities
7 Health
8 Recreation, culture and religion
9 Education
10 Social protection

*: Data for Iceland and Spain are in 2001, others are the data in 2002.

Source: OECD (http://www.oecd.org/dataoecd/42/46/33784637.xls, accessed on Oct 18, 2005)

Table 3: Typology of types of goods		
	Rival	Non-rival
Excludable	Pure private goods Examples: Pizza, toothbrush	Toll goods, natural monopoly Examples: software, satellite broadcasts, information goods
Non-excludable	Common property resources Example: Fisheries	Pure public goods

Figure 1: Isocost lines for production of public and private goods