Rational Ignorance, Rational Voter Expectations, and Public Policy: A Discrete Informational Foundation for Fiscal Illusion

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ABSTRACT

This paper demonstrates that rational ignorance, properly defined, allows the possibility that fiscal illusion affects policies in a democracy. The implications of rational ignorance are examined in a setting where voters are assumed to completely understand the fiscal environment and make perfect use of any information that they possess. In this setting, it is demonstrated that ignorance may be rational, manipulated, and generate biased expectations over fiscal parameters.

The analysis suggests that the electoral impact of voter ignorance is reduced, but not eliminated by electoral competition. Candidate positions *only* affect the electoral choices of individuals who are at least partially informed about those positions. Consequently electoral competition tends to generate policies that advance the interests of relatively informed voters. This implies that election based public policies are based upon better information than one would expect based on the widespread fiscal ignorance reported in surveys.

However, even in this setting, the votes cast and the policies adopted are affected by the estimated marginal rates of substitution between private and governmental services which *can not be unbiased* if areas of ignorance remain--even if voters make the very best use of information in their possession. The existence of rational ignorance, once carefully defined, is sufficient to generate policy relevant fiscal illusion.

I. Introduction

The term fiscal illusion has largely been retired from the public economics literature in the aftermath of the rational expectations revolution. As notions of rationality have been expanded beyond consistent preference orderings to include unbiased expectations, the idea that individual voters may be systematically misinformed has implicitly become associated with non-rational perspectives on human behavior. A fully rational individual "knows the model" and can not be fooled by mere political "cheap talk." Such arguments are taken to undermine the early analyses of fiscal illusion advanced by Tullock (1967) and Downs (1957). If voters "know the model" the

complexity of a tax code can not lead them to under estimate the costs of public programs, nor can the diffuseness of benefits lead them to under estimate their own benefits--or so it might be argued.[1]

Moreover, Oates (1988) finds little convincing empirical support for systematic errors on the part of voters. Wittman (1991, 1995) provides an explanation of Oates' empirical results by noting that voters may lack detailed information about the policy positions of candidates but may easily estimate or infer them if they can locate candidates on a left-right political spectrum. A left right spectrum has been shown by Poole and Rosenthal (1991) to be able to account for more than three quarters of the roll-call voting behavior of elected representatives in the US. Consequently, reasonably good estimates of candidate positions along a one dimensional issue space allows voters to estimate candidate voting behavior on many issues without having to acquire detailed information about candidate inclinations on every issue that may come before the legislature.

All these arguments seem to be well founded--yet introspection, casual observation, and survey evidence suggests that individual expectations about the policy consequences of particular policies may none-the-less remain quite biased. It must be acknowledged that, as good as the individual estimates based on candidate ideology and other readily available information may be, the error term remains non-trivial and often appear to have a nonzero mean. Personally, I am constantly learning new details about federal policies that amaze me--e.g. that confound my *ex ante* expectations. For example, the high variance of the imputed cost per life saved from pesticide regulation noted in Cropper et al (1992) was striking. I would have guessed that policies in that area would yield more or less the same cost per death under a variety of public choice assumptions. Clearly my expectations were not unbiased in that regard. In other policy areas, I am often amazed to find that "we" actually have policies. Such observations seem to be fairly commonplace among all persons that I am familiar with. Even well-informed voters appear to watch the news and read

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[1] The neoclassical public finance and public choice literatures had long been concerned with the extent to which voters are well informed on fiscal issues. Buchanan (1960) attributes the first clear statement of the idea of fiscal illusion to Puviani (1897, 1903), although he himself is one of the leading analysts of fiscal illusion, see Buchanan (1965, 1966). West and Winer (1980) trace the history of the concept of fiscal illusion back to J. R. McCullock (1851). Mueller (1989) provides an overview of recent developments and applications of fiscal illusion. Oates (1988) provides a somewhat skeptical overview of empirical evidence of the effect of fiscal illusion on the growth of government budgets. On the other hand, Caplan (1999) notes significant differences between the economic opinions of ordinary individuals and economists.

newspapers with the expectation of learning something *new*, not simply updating priors over matters previously known. Such behavior is consistent with a specific form of imperfect information that has electoral and policy implications explored in this paper.

There are two quite different concepts of what it means to be incompletely informed which are often confused, and which have very different implications for the kinds of personal behavior that we should observe in private and public life. Both concepts share the property that additional information or data can make one's personal forecasts of the future more accurate. Both may be said to arise when an individual collects and analyzes only a subset of the potentially available data. And, both may be the result of rational decisions to economize on information. As has long been stressed in economic theory, rational individuals will economize on information by using incomplete information to make their decisions, Hayek (1945), Stigler (1961).

In the concept most widely used by economists, learning is represented as a process of statistical search, signal processing, or sampling in which the "event space" is completely known by the individual doing the searching. Here the individual does not know what will be learned from sampling, but, in principle, knows all that potentially may be learned. That is to say, the searching-sampling individual knows the dimensionality of the probability distribution being appraised and learning simply reduces the variance of that individual's likelihood function defined over well-understood phenomena that potentially may occur in the real world.

According to the other conception of imperfect information, what might be called ignorance, the dimensionality of the event space is, itself, to be learned. Ignorance allows the possibility that previously unrecognized possibilities may be learned or discovered. This, of course, is only possible if an individual remains totally unaware of some possibilities. Much of the learning that takes place in educational institutions is of this form. For example, most principles of economics students learn for the first time what supply and demand, externalities, real interest rates, multipliers and elasticity are, rather than simply refine their previously held beliefs about such phenomena and indices.

The distinction between finite-sample and ignorance based notions of imperfect information would simply be a curiosity, perhaps an epistemological footnote in an economics or econometrics text, were their implications for individual behavior identical. But they are not. It is clear in the imperfect information as *finite sample* case, that as long as an individual samples the *entire distribution*

(event space) of available information and applies an appropriate statistical method to analyze what ever sample is obtained, the estimates derived can be unbiased. Even a single complete observation of a random phenomena allows an unbiased estimate of the mean of the distribution, Kmenta (1971, pg. 102). Consequently, this form of incomplete information is not generally a serious problem for private or public decision making. Such imperfectly informed but rational consumer/voters would purchase goods and vote for the candidates or policies that maximize expected utility, and both the pattern of private services and electoral based fiscal policies would reflect the preferences of voters as weighted by the electoral system in an expected value sense. "Errors" may be larger than would have been the case if individuals had obtained larger samples, or more complete information, but the results on average are what they wish to obtain.

Statistical theory suggests that such a result requires individuals to have some information about all potentially relevant dimensions of choice. The existence of ignorance implies that this can not be the case. *Ignorance* occurs when an individual is, or chooses to remain, *completely uninformed* about some relevant dimensions of the distribution of interest. In a private choice context, an individual is rationally ignorant when he decides not to acquire or analyze information about the existence or potential existence of some goods and services. In a public policy context, rational ignorance arises when an individual chooses to gather or consider no information about at least some dimensions of public policy.

This paper demonstrates that estimates and expectations based on such truncated samples *can not be unbiased even if the correct model is known* and sophisticated statistical methods are employed. Such rationally ignorant individuals may be fully "rational" in the sense that they *make the best possible* use of the information that they have available to them, but they *can not* have unbiased expectations across all policies, and, thus, can not be "rational" in the "unbiased" expectational sense the term has come to be used in the 1990s. This conclusion complements those of Fremling and Lott (1996) who demonstrate that incorrect theories (identification or specification errors) typically lead to biased estimates of relevant control variables in the macro economy. The present analysis shows that unbiased expectations can not be generated by rationally ignorant individuals even if the correct model is known.

Within the context of fiscal choice, the analysis demonstrates that rational ignorance allows the possibility of systematic fiscal illusion and manipulation. In this, the analysis of the present paper supports the fiscal illusion literature of the 1950's and 1960's. Although rational ignorance may not, itself, systematically affect policy choices in a single direction, rationality implies that individuals are systematically affected by the cost and anticipated value of information. This implies that biased expectations within particular policy areas may be systematic insofar as the cost of particular types of information is relatively high compared to others.[2]

The remainder of the paper is organized as follows. Section II discusses ignorance and incomplete search as particular kinds of imperfect information. Section III characterizes six properties of rational ignorance and demonstrates that rational ignorance is a sufficient condition for the existence of fiscal illusion. Section IV develops some electoral implications of rational ignorance. It demonstrates that even well-behaved voting equilibria are unlikely to be informationally first best outcomes in a setting where rational ignorance is widespread. In the case examined, electoral outcomes *reflect the policy preferences of well informed voters*, yet still embody the effects of fiscal illusion. Two appendices develop a private planning model of the demand for fiscal information, characterize decisions to invest in fiscal knowledge in a setting of ignorance, and note sufficient conditions for the existence of rational ignorance.

II. Natural and Rational Ignorance

Ignorance, in the sense used in this paper, is a discrete phenomena. Ignorance occurs when one is totally uninformed about some fact, phenomena, conditioning variable, or characteristic. In some areas of deterministic phenomena, ignorance and knowledge are clearly binary, 0-1, states--one may know a fact or not. In other areas, ignorance and knowledge appear to be a continuum. One may or may not know that particular phenomena exists or not, and, *once known*, one may know or understand the phenomena with more or less precision. The initial

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[2] Recent work on the power of special interest groups implicitly relies upon such systematic voter ignorance as the basis for the political influence of special interest groups. Under an open primary system, where any candidate may enter and seek to be elected, candidates who appeal to median voter self-interest would tend to do better than those who promote narrow economic, regional, or ethnic interests--unless many voters are ill-informed about relevant policy details or implications, or vote as if they were members of distinct interest groups. Papers by Austen-Smith and Riker (1987), Tullock (1989), and Coughlin, Mueller and Murrell (1990) make explicit the manner in which informational problems may empower special interest groups.

ignorance-knowledge threshold remains binary. Either one knows the phenomena exists or is possible, or one does not. Once that threshold is reached, an individual potentially enters the continuous range which is the subject of statistical analysis. The latter is principle focus of work on imperfect information within the modern search and signaling literatures derived from Stigler (1961). Once known, an individual may make more or less accurate estimates of the characteristics or conditional distribution of a particular stochastic phenomena. However, before knowledge of a phenomena is acquired or discovered, there is subjectively "nothing" for the individual to estimate.

Both sorts of imperfect information are fundamentally consequences of what might be called natural ignorance. Individuals are born into the world in a *naturally ignorant* state, largely ignorant of all things. Through time the domain of natural ignorance shrinks as knowledge is accumulated or developed and *decisions* to acquire additional information play a larger role in determining whether various bits of information are acquired, analyzed, or ignored. As part of this process, awareness of one's own ignorance tends to increase as rational ignorance gradually displaces natural ignorance. This aspect of the process of learning is, of course, the resolution of the conundrum "the more we know the less we know." Most individual ignorance, even in adult life, remains natural inasmuch as many feasible kinds of information are never imagined and so never considered.

Rational ignorance is the thin line separating natural ignorance and knowledge. In order to *choose* to remain ignorant of a phenomena, one must first realize that the phenomena exists. In order to remain ignorant once a phenomena is known to exist, or to potentially exist, one must choose to remain entirely uninformed about the details of that phenomena. Interpreted in statistical terms, rational ignorance implies that an individual knows that a variable or dimension exists but decides not to collect any data or sample that particular variable or dimension--relevent or not.

Examples of rational ignorance for most of us include: mandarin Chinese, chaos theory, agricultural land use restrictions, tax preferences for insurance companies, the eye colors of current teen rock stars, etc. Even rudimentary knowledge in may of these potential areas of knowledge is judged to have costs greater than their expected benefits. Until very recently, the same rational ignorance would have been widely associated with information concerning air bags, personal computers, the internet, carbon taxes, and genetically engineered corn. Under rational ignorance,

the existence of a particular kind of information is acknowledged, but no investment is made to obtain or analyze it.[3]

As an outcome of choice, rational ignorance is affected by economic incentives. Rational ignorance reflects the optimizing behavior of individuals given various constraints on information processing and acquisition. This makes it potentially amenable to analysis using conventional economic tools and concepts. However, it bears noting that it is by no means obvious that ignorance, per se, can ever be the result of a rational choice. Most ignorance is not. One can not apply statistical decision theory unless a phenomena is known and is recognized to have bounds or a particular distribution. The appendices demonstrate that individuals can rationally choose to remain ignorant of fiscal details if they known just a bit about fiscal budget constraints.

What is relevant about both natural and rational ignorance from a public choice perspective is that ignorance potentially allows policy making within a democracy to systematically depart from the interests of the median or typical voter. For example, regardless of the origins of an individual's ignorance of policy relevant fiscal information such as marginal excise tax rates, (never thought about learning about a tax, or thought about learning about that tax but decided not to), the result is an estimated marginal tax price for this service that is *systematically* different from the actual marginal tax price. Such individuals will tend to vote for service levels that are systematically different from those which would have actually maximized utility. Ignorance of at least some program benefits, similarly, can lead voters to systematically misjudge the worth of proposed programs.

One of the central questions addressed in this paper, is whether such *biased estimation can be fully rational* in the modern sense of that word. To explore that question, the analysis focuses

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[3] It bears noting that fifty years ago, these last areas of modern knowledge were all part of natural ignorance--areas where ignorance was so complete as to rule out deliberation. Much of economic progress is attributable to the gradual reduction of natural ignorance, at least among experts, as new possibilities for products, production methods, and lifestyles are discovered and implemented by "informational" innovators and pioneers.

Most of the changes in the lifestyles of a typical man or woman in a western country that took place during the past century are the results of informational changes, especially technological innovation. Very few of the tradable amenities of modern life, now taken for granted, were available *or widely imagined* only a few decades ago. The great expansion of opportunity sets was not the result of a great shift in the global supply of natural resources, but rather a significant reduction in ignorance about their potential uses.

principally on the consequences of rational ignorance in a setting where individuals make perfect use of all the information that they have available to them. Obviously, if individuals generally do not make good use of the information in their possession, or are generally uninformed in the sense of natural ignorance, unbiased expectations would not often be the direct result of individual effort.

III. Rational Fiscal Ignorance

There are many reasons why an individual may choose to be informed about fiscal policies. Perhaps the most economically obvious, but neglected, of these is that information about government fiscal policies potentially allows individuals to better allocate private funds to take advantage of complementary and substitution relationships between public services and private services. For example: knowledge of future mass-transit plans allows one to shift resources from (or to) private transport to (or from) other activities. Knowledge of the tax proposals of alternative candidates allows individuals to adjust their current portfolios to account for risks and opportunities implied by new tax policies.[4] Knowledge of regulations which reduce highway accident rates may enrich insurance company shareholders while reducing sales of replacement parts and vehicles. Knowledge of available transfer programs allows one to qualify for and receive direct pecuniary benefits. Knowledge of changes in government purchases of computer software, cruise missiles, and concrete allows stock market speculators to profit from changes in the net revenues of firms supplying such goods and services.

The personal planning demand for fiscal information implies that individuals would acquire significant fiscal information even if they did not plan to vote or otherwise participate in elections. The opportunity to vote in elections stressed in most previous analyses of voter ignorance also affects decisions to acquire fiscal information, but this is, as we shall see mainly because of increased uncertainty about future policies rather than prospects for influencing policy by casting votes. The logic used by Alesina et. al. (1993) to motivate electoral business cycles implies that individual incentives to learn fiscal details are greater *after* an election than before an election.

The "personal planning demand" for fiscal information implies that individuals will be better informed about fiscal policies than the voting literature seems to imply.[5] Yet, it also allows the

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[4] The importance of the probability of electoral success in such hedging strategies is may partly explain why the news media devotes so much time to presenting polling data.

possibility of considerable rational voter ignorance, as indicated by survey evidence; see for example Neuman (1986) or Carpini and Keeter (1997).[6]

IV. Some Properties and Implications of Rational Ignorance

A model of rational fiscal ignorance is developed in appendices A and B. That analysis allows us to characterize some general properties and implications of rational decisions to acquire fiscal information in a setting of ignorance.

Proposition 1, ignorance can be rational.

The model demonstrates that it is possible to make Bayesian assessments of the expected value of bits of fiscal information even in cases where little, *ex ante*, is known about the particulars of the information that will be acquired. If individuals know their own utility functions and the integrals exist for equations 8, 10, 12 and 14 as characterized in the appendices, the expected utility levels associated with various levels of ignorance can be characterized. Given specific values for personal income Yo, and cost share t, individuals can calculate expected utility levels. The expected utility levels are real numbers which can be ordered according to magnitude. It is clearly possible that the expected utility of partial or complete fiscal ignorance lies above that of complete information. Ignorance can be rational.

Proposition 1 implies that rational ignorance is completely compatible with conventional models of forward looking self-interested individual behavior.[7] Ignorance often rules out rational

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[5] It is easy to exaggerate the extent to which voters are rational ignorant of government policies by focusing exclusively on private incentives to acquire policy relevant information as a means of improving electoral outcomes. Given the very limited influence that an individual can have on electoral outcomes in elections involving millions of voters, it is clear that the private election-based demand for information would be very modest and voters would be very widely and very rationally uninformed.

See for example, Tullock (1967, pg. 101). "Public problems are normally more important than private problems, but the decisions by any individual on a private problem is likely to be more important than his decision on a public problems, simply because most people are not so situated that their decision on public matters makes very much difference. It is rational, therefore, for the average family to put a great deal more thought and investigation into a decision such as what car to buy than into a decision on voting for President."

[6] Survey evidence on voter ignorance is often quite striking. For example, Carpini and Keeter (1996) report that less than two thirds of those surveyed can identify which of the major American political parties or their candidates is more conservative (table 4.9, pg. 160).

[7] Note that this is not true of matters over which one is naturally ignorant. Here the

decision making insofar as the Bayesian approach requires the dimensionality of the underlying phenomena to be known, but rational ignorance does not.

Proposition 2, the Relevance of Pecuniary Interests. Individuals with a personal economic interest in particular sorts of fiscal knowledge will never be less well informed than otherwise similar individuals without a pecuniary interest in the fiscal information.

Demonstration: note that a direct pecuniary interest in fiscal information implies that income increases as information is acquired. If information about some fiscal policy increases personal income, the expected utility associated with that particular bit of knowledge will be higher than if it does not, and individuals will be more inclined to purchase such information.

Appendix B implies that if relevant public and private services, A, B, G, and H are goods in the usual sense, then:

$$U(A, Y_2 - A - C - t(G+H), G, H) > U(A, Y_1 - A - C - t(G+H), G, H)$$

for $Y_2 > Y_1$ and every combination of G, t, and H. (Future consumption B can be written as $Y_2 - A - C - t(G+H)$ where t is the individual's tax burden and $Y_2 - Y_1$ is the income increase generated by fiscal information.) The expected value of being well-informed on fiscal matters is simply the probability weighted average of the range of the utility levels that might be realized. Because income increases for individuals that obtain particular fiscal information, it follows that the expected value of information about service level G is greater for an individual who receives income Y_2 contingent on knowing Go than that for otherwise similar people who receive only Y_1.

Proposition 2 implies that *members of economic interest groups tend to be better informed* about personally relevant fiscal parameters than otherwise similar individuals who lack a direct pecuniary interest. Interest group members are less likely to remain rationally ignorant of personally relevant fiscal parameters than other individuals because they have greater interest in the information and may face lower costs insofar as the group helps to disseminate information. It bears noting that a

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conventional Bayesian representation of learning as a process of updating priors breaks down. Because the dimensionality of the underlying information space is unknown, *no rational expected value calculus over the value of what might be known is possible.* Priors over the value of a generalized *activity of learning* could allow a rational calculus to be applied to the process of discovering the personally unknown, but this method is not based on the value of particular kinds of information, but rather the utility of past instances of learning.

pecuniary interest in fiscal (and regulatory) details extends beyond those individuals who directly deal in fiscal information such as lobbyists and tax accountants. Individuals within firms or agencies with financial interests linked to fiscal policies are often well advised to keep up on relevant fiscal details because being well informed on matters of interest to "the firm" increases their intra-firm productivity and thereby their salaries.

Proposition 3, the existence of rational fiscal ignorance is a sufficient condition for the existence of fiscal illusion.

Recall that in a setting of complete ignorance, Bayesians arbitrarily use a diffuse (uniform) distribution as their initial prior. As information is obtained and Bayes' law is applied, the posterior distribution gradually converges to that of the actual stochastic process that generates the phenomena of interest. Bayesian "updating" in this sense is an unbiased learning or estimation mechanism. However, this process of convergence never takes place for individuals that remain rationally ignorant because their sample size remains 0, e. g. no new information is acquired.

A diffuse prior estimator over a fixed interval *always yields the same estimate* regardless of the actual value of the parameters being estimated, e.g. the midpoint of the interval(s) over which the uniform distribution is defined. Since the intervals over which diffuse priors are defined are not conditioned on actual parameters of the process that selects services and taxes, it follows that diffuse priors can not be an unbiased estimator of service levels or tax burdens. That is to say the true process generating the service levels or tax burdens may have different means and variances than the uniform distribution used in Bayesian analysis in settings of ignorance. The initial diffuse prior is a point of departure, not an unbiased estimate of the actual mechanism that will be discovered. Bayesian rational ignorance generates fiscal illusion whenever a bounded diffuse prior estimator of fiscal parameters is a biased estimator.

It bears noting that the conventional Bayesian approach has been used here and in the appendices to make the analysis concrete, but this conclusion is not dependent on the use of a uniform distribution of priors.[8] *Any prior distribution* conditioned only on the boundaries of the fiscal

[8] One possible exception to this proposition would be the case where actual fiscal policies are, for what ever reason, generated by the same stochastic process as the individual's prior distribution. For example, one could imagine a collective choice process whereby service levels are determined by rolling dice subject to the budget constraint. Purely stochastic processes of fiscal choice are

set would share this property. The expected value of such distributions is independent of the actual (or expected) parameters of the fiscal process of interest, and hence can not be an unbiased estimator of those fiscal parameters. Although knowledge of fiscal relationships allows one to bound the range of priors, it does not allow unbiased estimation in the absense of other information.

Proposition 3 implies that it can be "irrational" for individuals to assemble and process the broad informational base necessary to develop uniformly unbiased or "rational" expectations. Even complete knowledge of general fiscal relationships is not sufficient to assure unbiased estimates of government service or tax levels.

Proposition 4. Rational ignorance is greater before elections than afterwards.

Demonstration: note that a candidate's unknown policy positions embody electoral uncertainty as well fiscal uncertainty before an election takes place. Voters are uncertain about whether the candidate's platform will in fact be adopted, as well as the details and effects of a candidate's espoused positions. Consequently, the expected utility associated with information about a candidate's position is weighted by the probability of electoral victory and eventual legislative success. Since probabilities have to be less than one by definition, this implies that pre-election policy information is less valuable than post election information, other things being equal.[9]

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implicitly ruled out here by the assumption that it is possible to know future service levels in the current period. With a less extreme assumption about what is knowable, bias would be assured as long as expected service levels are conditioned on other political or economic variables in addition to the fiscal budget constraint. See Fremling and Lott (1996).

[9] Assume that an elected candidate always implements the program he espoused during the pre-election campaign. Denote the *ex ante* expected utility of information about candidates 1's policies as U^e_1. The expected utility of information about candidate 1's policy positions prior to the election is:

$$U^e = P\, U^e_1$$

where P is the probability that the candidate 1 is elected and implements the fiscal policies espoused during the campaign. An individual's acquisition of new information about a candidate's policies does not materially affect the probability that a particular candidate is elected.

If the challenger has any chance of winning, $P<1$, and $P\, U^e_1 < U^e_1$. Consequently, the planning advantage of learning a candidate's unknown fiscal position before an election *has to be below* that associated with learning which fiscal policies are actually adopted after the election take place.

Proposition 4 implies that if there is any uncertainty over whether candidates may be elected, individuals are less interested in the positions of candidates *before* an election than in the post-election positions of successful candidates.[10] An implication of this result, is that a typical voter tends to know more about an incumbent's fiscal policies than about the challengers. This is one source of incumbent advantage in elections. See Congleton (1986) or Banaian and Luksetich (1991). Moreover, Proposition 4 suggests that the *private plans* put in place after an election will be based upon *better* information than the electoral decisions made prior to knowing the electoral outcome. This contrasts with Wittman's (1995) argument that public and private decisions are more or less equally well informed. Voting tends to be based upon less complete information than private consumption and investment plans made after the election.

Proposition 5, Subjectivity: an informed external observer cannot generally deduce the value of fiscal knowledge for an individual without substantial information about the individual's utility function--even though he knows the individual's income and cost share, Yo and t.

Demonstration: It is sufficient to show that ambiguity exists in at least one case. For purposes of illustration, suppose that actual expenditures on government services H and G are equal, so that Go = Ho. In addition, assume that the ideal expenditure levels of H and G for the individual in question are not the same. This implies that the marginal utility of H differs from that of G at the actual service levels. Let $U_G < U_H$ at H = G. To take a strong case, suppose the external observer knows Go and Ho. Whether the currently ignorant individual will benefit most from knowing Go or Ho is a matter of the expected utility associated with knowing Go or Ho. With Ho known, one evaluates expected utility levels for unknown levels of G, given private consumption level $A^H = a^H(G,Ho,Y,t)$. With Go known, one averages utility levels across unknown levels of H, given private consumption level $A^G = a^G(Go, H, Y, t)$. From equation 9, the expected utility associated with knowing G is t/(Y-tGo) times the area under the curve $U(A^G, B, Go, H)$, the average height of the utility function over the range of possible levels of service H. From equation 10, the expected utility associated with knowing H is t/(Y-tHo) times the area under the

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[10] Note that this proposition implies that in a series of elections, incumbent positions will be better known than challenger positions. Given risk averse voters, this provides an explanation for the incumbent advantage reported in the empirical elections literature.

curve $U(A^H, B, G, Ho)$. Since Ho equals Go by assumption, the relative size of the areas under the respective curves determines the relative size of the two expected utility levels. This is a matter which cannot be determined without knowing specific values for the derivatives of U.

Proposition 5 implies that an external observer cannot generally determine what kind of information a particular individual will benefit from most unless fairly detailed knowledge of an individual's tastes for government services and economic interests are available. Within the model, whether an individual's expected utility increases more by knowing T, G or H depends, (i) on the degree of individual risk aversion, (ii) on the extent to which the information will allow one to improve one's pattern of private consumption, that is to say complement and substitution relations between public and private services, and (iii) on the *direction of bias* generated by expectations without such knowledge.

Proposition 6, Manipulability: the cost of information affects voter decisions to remain rationally ignorant.

Demonstration: in every case examined to this point, the cost of information affected the level of fiscal information acquired. It is clear that a sufficiently low price can induce every voter to obtain complete information since private plans are better when then are informed plans, ignoring information costs. On the other hand, it is also clear that a sufficiently high price can discourage all informational investments. Continuity implies that there is a cost, C^{inf}, that will make an individual indifferent between being informed and remaining ignorant. Once the cost of information falls below C^{inf}. the individual chooses to be informed rather than ignorant.

Proposition 6, thus, implies that the *very rationality of rational ignorance potentially allows the degree of rational ignorance to be manipulated*, as stressed by Puvianni (1897, 1903) and Buchanan (1960). Rational ignorance increases as C , *ex ante*, increases and falls as it is reduced below the C^{inf} threshold. Moreover, it is clear that politically active individuals and groups often attempt to engage in this form of manipulation. For example, candidates and interest groups use most of their resources for "getting the message out." That is to say, candidates raise money in order to strategically reduce the cost of information that they expect will increase their relative attractiveness to voters by funding the dissemination of carefully chosen bits of information to voters through a wide variety of communications media.

V. Elections with Partly Informed Voters

We now turn our attention to the extent to which rational ignorance affects electoral outcomes and thereby public policy. It may well be the case, as noted above, that voters are inclined to remain rationally ignorant about many policy relevant details, but it is possible that electoral competition eliminates the effects of that ignorance. First, as noted above, and by Wittman (1995) and many others, political candidates have an interest in reducing the cost of information to voters as a method of increasing their own prospects for election. Although candidates have no particular interest in subsidizing the dissemination of unbiased or complete information, their efforts tend to reduce rational ignorance by making some kinds of information difficult to ignore.[11] If voters can filter out the biases of the information distributed by candidates, as assumed in the present analysis, rational ignorance is replaced with informed opinion *in all areas of policy where information is sufficiently subsidized*.[12] In areas where information is not sufficiently subsidized rational ignorance is essentially unaffected. It is because of these remaining areas of ignorance that fiscal and other illusions may potentially affect public policy.

Second, and perhaps more important given the survey evidence on the typical scope of voter knowledge, the ignorance that remains plays a smaller role in election based policy formation than might be expected because *well-informed voters have a disproportionate impact on the policy positions of*

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[11] Proposition 5 implies that candidate efforts to manipulate information costs to maximize their chances of electoral success will be imperfect. Proposition 2 suggests that candidates will find it less costly to get particular policy positions across to groups with more or less easily identified and homogeneous economic interests. Consequently one expects candidates to target their messages at groups with an economic interest in particular policies rather than to broadly disseminate their positions on all issues to all voters.

It bears noting that the competitive process of freely distributing information does not necessarily reduce a voter's information costs to zero. Insofar as that information needs to be analyzed or otherwise processed, there will always remain an irreducible positive information cost even for such freely available "data."

[12] A candidate would clearly have a greater chance of electoral success if he or she could induce a downward bias in the expected utility associated with their opponent's policies and an upward bias in the assessment of their own. The assumptions used for the present analysis imply that biased expectations can not be directly produced by subsidizing biased information because voters are assumed to perfectly filter all information acquired. See Congleton (1986) for an analysis of electoral competition where voters can be unduly influenced by candidate messages when campaign messages are free, and voters use Bayesian updating. Morton et. al. (1993) develop empirical evidence that campaigns produce information.

candidates. However, as demonstrated below, electoral competition does not completely eliminate the effects of rational ignorance and fiscal illusion even in a setting where well informed voters determine electoral outcomes.

To see this, consider an election between two candidates in an electorate composed of three groups of voters. Let us again focus on the GxH domain. Returning to the model developed in the appendices, assume that members of two of the groups have sufficient pecuniary interest in particular service areas to have become informed on candidate policies in an area of concern, given information costs net of candidate subsidies. Designate as Group *h* the group interested in service level H, and Group *g* as the group interested in service level G. Assume that the third group, Group *i*, lacks sufficient interest in either service level G or H to warrant acquiring fiscal information regarding either policy dimension, and therefore remains rationally ignorant of candidate positions on service levels G and H.[13]

Voters from Group *h* evaluate the candidates based on information about candidate positions along dimension H and according to uninformed expectations about the candidate's position in dimension G. This yields an expression for expected utility similar to that of equation 12, except that in this case, two units of fiscal information have been acquired, one for each candidate. Let Ho denote the position regarding service level H taken by the candidate of interest.

$$U^e = \int_0^{(Y-tHo)/t} U(A^H, Y - A^H - t(G+H) - 2C, G, Ho)(t/(Y-tHo))\, dG$$

In equilibrium, vote maximizing candidates will adopt the position that is most attractive to the median *informed* voter in the H policy domain. Since voters other than members of Group *h* are not directly aware of the specific candidate positions taken in this policy subspace, their opinions on policy H are largely irrelevant for candidates. A similar conclusion holds for Group *g* regarding policy G. The opinions of members of the third completely ignorant group *i* do not affect candidate positions at all in the GxH policy domain because their estimates of candidate positions (service levels) are not affected by their actual policy positions. Candidate incentives to take

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[13] The third group of voters could be informed on other issues. What matters for the purposes of this illustration is that whatever other information they might possess does not shed any light on candidate positions in the GxH domain.

explicit positions in the GxH policy domain are entirely the result of the informed preferences of groups *h* and *g*.

Figure 1 illustrates the essential geometry of this electoral equilibrium. The vertical lines represent expected utility levels for the median member of Group *g* as candidate positions vary. The line at G** represents the expected utility maximum for the median member of Group *g*, given his expectations about policy H which are not affected by the actually positions taken by candidates along this dimension. The horizontal lines represent expected utility levels associated with alternative service levels for the median member of Group h. H** is the ridge line, or expected utility maximum, for the median member of Group h given his expectations about policy G. Rational ignorance implies each of these groups acts as if the election takes place within a *single issue* space, G or H respectively. Consequently, median voter equilibria exist for each dimension.[14]

The candidate who locates nearest to H** will receive a majority of votes of Group H. The candidate who locates closest to position G** will receive the majority of the votes cast by Group *g*. The electoral equilibrium in the GxH domain is determined by the votes cast by the informed groups and occurs at the point where the lines representing G** and H** intersect.

Note that the median voter of each informed group of voters gets exactly what she wants. *Knowledgeable voters rather than uninformed voters determine electoral results* in such elections because they are the only voters whose votes *can be* influenced by candidate positions! On the other hand, each group of informed voters is only narrowly informed about the issues. Pecuniary effects of policies on voters in their role as input providers rather than a demand for public services *per se* largely determine which issues voters are informed on.[15] Diffuse priors over the other fiscal variables implies that accurate forecasts of other aspects of candidate positions would be accidental.

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[14] Congleton and Sweetser (1991) provide empirical evidence that unbiased fiscal ignorance increases stability and may improve the performance of democratic decision making over that obtained under perfect information by creating a setting analogous to the Rawlsian veil of ignorance. Here, limited rational ignorance may, similarly, help stabilize policy outcomes under majority rule.

[15] Uninformed voters may vote on the basis of non-policy characteristics of candidates such as personality, region, or party affiliation. Carpini and Keeter (1996, pg. 259) report that relatively uninformed voters cast their votes against incumbents based on their own personal economic circumstances rather than the policy positions of candidates.

As long as these factors are ex ante *orthogonal* to their policy positions, such information about candidates will be insufficient to inform voters of candidate positions in the GxH plane. In this case, the votes of the uninformed group are distributed uniformly among the candidates. Vote

In general, diffuse priors may imply either upwardly or downwardly biased expectations of service and tax levels. Figure 1 depicts a case where G^e and H^e are the expected values of service G and H for the median member of Groups h and g respectively. Group *g* has over estimated the level of service H, $H^e > Ho$, and Group *h* has under estimated the level of service G, $G^e < Go$. This estimation error implies that the combination of public services provided differ from that which would have been chosen given complete information (or unbiased estimates). *The "preferred" service levels are not those that decisive voters would have chosen in a fully informed setting.* This, of course, is the problem emphasized by the many analysts of fiscal illusion prior to the rational expectations revolution.

Although the electoral outcome is determined by informed voters with unbiased estimates of the policy values of personal interest, some effects of fiscal illusion remain. Fiscal illusion affects the combination of services actually provided. For example, if G and H are complements for members of both informed groups, Group *g* would have preferred a smaller level of G had they accurately forecast H, and Group *h* would have preferred a larger level of H had they correctly forecast service level G. *Individual biases do not necessarily cancel each other out* in elections.[16]

It also bears noting that the implied electoral outcomes may be less benign than the ones generally analyzed in voting models, even though they are relatively efficient. The voters with the greatest incentive to acquire particular bits of policy information tend to be those with an unusually

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maximizing candidates will have an interest in maximizing votes from the informed groups by taking appropriate positions in the GxH policy space even if the overwhelming majority of the electorate remains uninformed about candidate positions in the GxH domain.

[16] Note that it may be argued that the results of the simple equilibrium illustrated are *ex ante* Pareto efficient in as much as any change in service levels will make members of one of the groups worse off, *given voter expectations* about service levels and taxes. This is a consequence of the "single issue" voting *that resulted from* rational ignorance in the case examined.

In cases where groups are heterogeneous, and interested in more than one dimension the usual indeterminacy of spatial voting model will obtain unless Plott (1967) symmetry conditions hold. The model can be recast in a stochastic choice framework to generate *ex ante* results similar to those of Mueller, Murrell, and Coughlin (1990), and yet the policies may be *ex post* inefficient because of the effects of fiscal illusion.

It bears noting that the addition of a fourth *completely* informed group does not generally affect the electoral outcome. Unless this informed group is large enought to include the pivotal voter of each of the two special interest groups, candidates will still generally maximize votes by catering to the partially informed pivotal members of the two interest groups.

strong personal stake in the policies at issue rather than those with ordinary demands for public services. It is these voters who can most cost effectively be influenced by candidate positions and policy-relevent information subsidies. In this manner, rational fiscal ignorance potentially allows economic and other interest groups to directly capture the electoral process without organized lobbying efforts or implicit bargains struck over campaign contributions--simply by casting votes.

VI. Conclusion

A good deal of the recent literature in political economy can be interpreted as attempts to show how "older" theories can be made compatible with the rational expectations and game theory revolutions. For example, the political business cycles models of Alesina et. al. (1993, 1993) show that elections themselves can generate information which can affect economic activities if party platforms do not fully converge. The work of Rogoff (1991) shows that talented administrators may be able to use budgetary policies to signal their relative superiority to the electorate. This paper has demonstrated that the possibility of fiscal illusion can be fully compatible with informational rationality. Voters can make complete, indeed perfect, use of all the information that they possess in a setting where they completely understand the underlying fiscal realities. Yet, if voters choose to remain *ignorant* about a subset of policy parameters, the very best estimates that they can form can not be unbiased. That is to say, "rational" expectations *can not* be completely unbiased in policy areas where individuals are rationally or otherwise ignorant.

The very rationality of rational ignorance implies that the degree of voter ignorance is affected by economic considerations along some margins. Consequently, electoral, and thereby policy outcomes, can be affected by systematically altering information costs as posited by Puvianni (1897, 1903), Buchanan (1960) and many others. Rational informational *decisions* are affected by relative prices. Electoral competition moderates the effects of rational ignorance, but it does not eliminate them.

Whether fiscal illusion of the sort emphasized by Downs and Tullock has systematic effects on the overall size of a government's budget can not be directly determined from the present analysis. Downs argued that in some policy areas, services would be under provided because individuals have a very difficult time assessing all the private benefits generated by such policies. Tullock argued that government services may be over supplied because the personal tax price is so

difficult to assess. To explore these possibilities would require a richer model of individual policy evaluation than the one used above where individuals were assumed to *fully* understand the benefits and tax burdens associated with every possible combination of government services.

However, their basic arguments are consistent with the analysis of rational ignorance developed here insofar as the cost of acquiring information about taxes or service levels within specific policy areas tends to be relatively high for essentially all voters. In some policy areas many voters may remain rationally ignorant of the specific service levels while taking steps to become informed about their personal marginal total tax burden. In other areas, many individuals might remain rationally ignorant of the tax costs associated with a program although they become knowledgeable about its service levels. A brief reflection on the many years of work invested by Public Finance specialists to appraise tax burdens and the cost of public funds (see, for example, Browning (1976, 1987)) makes it clear that the cost of fiscal information is often far from trivial. Overall, rational ignorance in such cases may affect the *allocation* of government moneys--too much to some programs and not enough to others--without affecting the magnitude of *total* government spending, as has often been the premise in empirical work.

The principal contribution of the present analysis is to distinguish between policy relevant and irrelevant forms of imperfect information by sharpening the definition of rational ignorance and exploring some implications of rational ignorance for majoritarian decision making. The paper is consequently long on reasoning, but necessarily short on examples. Evidence of policy relevant changes in rational ignorance does exist and bears noting.

Changes in information that reduce ignorance will affect policy preferences in a different manner than ones that increase sample size. Changes in ignorance/knowledge can lead to dramatic changes in a voter's preferred policy, or policy reversals, as totally "new" policies are evaluated or policy consequences are taken account of. Changes in information that effectively increase sample size tend to have modest affects on the policy preferences of rational voters. Reduced estimation errors affect the perceived riskiness of alternative policies and thereby the expected utility associated with those policies for risk averse voters. Reduced ignorance may affect expected values as well as perceived risk.

This line of reasoning suggests that the two kinds of informational imperfections have different effects on policy through time to the extent that policy reflects electoral equilibria. Modest evolutionary revisions to policy tend to be generated by new information when learning reflects greater experience (a larger sample). Radically shifts in policy may be generated by reductions in rational ignorance. Areas in which the dissemination of (lower cost) "new" information appears to have radically changed policy in the past century include: (i) environmental regulation, (ii) price controls on oil and energy resources, (iii) regulation of transport and telecommunication industries, and (iv) macro economic efforts to exploit the Phillips curve. In each of these cases, the dissemination of new information about *pre-existing processes* appears to have radically transformed government policies one or more times during the past century. Indeed, in many cases there have been clear reversals of policies which are difficult to rationalize within conventional rational choice based equilibrium models of voters or interest groups.

Such changes in policy are consistent with the existence of rational and natural ignorance. Ignorance allows the possibility of "informational shocks" that can dramatically change both voter and expert assessments of the relative merits of policy alternatives. It is ignorance that implies many of today's regulatory and tax policies will eventually be considered to be systematically wrong because of mistakes (uninformed expectations) rather than perverse political considerations or unusually bad luck. It is ignorance that allows good social science to induce changes in public policy that go beyond narrow refinements. Rational ignorance allows the possibility of genuine mistakes as well as bad luck. Economizing over basically well understood informational opportunities via finite samples does not.

Appendix A: A Model of Rational Fiscal Ignorance

In order to illustrate the logic of the above propositions, consider the following very lean fiscal informational choice problem. Suppose that an individual knows of the existence of various fiscal parameters, but not their values. That is to say, suppose that the individual has to this point chosen to remain rationally ignorant of several fiscal parameters. The case of interest here is one where the individual is *completely informed about fundamental economic and fiscal arrangements*. The individual taxpayer's utility function is defined over current and future personal consumption, A and B, and two future government services, G and H, and is assumed to be strictly concave. The individual knows his pretax lifetime income, Y = Yo, and understands that he bears a tax equal to a fraction, t, of the total cost of government services to be provided. This fraction might be deduced from general features of the underlying tax system. His tax burden is T = t(G+H) in the case where G+H is the cost of the government programs. Individuals maximize expected lifetime utility by allocating their after-tax lifetime income between current and future consumption an fiscal information.

Initially assume that "the government" exogenously determines future public service and tax levels independently of a particular individual's willingness to pay for them. In a median voter model of fiscal choice, this tends to be true for all individuals except those who share the median voter's ranking of fiscal policies.

Suppose the individual has the opportunity to purchase *definitive* information about future tax burden, and/or various service levels. Obviously definitive information is more valuable than information that allows one to make efficient unbiased forecasts of tax burden and service levels. Thus, if one can demonstrate that perfect information may not be worth its cost, the same conclusion would apply to equally costly but less accurate information. Under what circumstances will the individual find it in his interest to be well informed?

In order to analyze this question, it is useful to examine the private consumption plans that would have been made in a setting of perfect information. An individual who knows public service levels G, H and tax, T, would set current consumption A and future consumption B to maximize:

$$U = u(A, B, G, H) \qquad (1.0)$$

subject to:

$$Yo - T = A + B \tag{2.0}$$

with

$$T = t\,(G+H)$$

$$0 \leq T \leq Y, \quad G = Go \text{ and } H = Ho$$

and

$$U_A > 0,\ U_B > 0,\ U_G > 0,\ U_H > 0,\ U_{AA} < 0,\ U_{BB} < 0,\ U_{HH} < 0$$

$$U_{AB} > 0,\ U_{AG} > 0,\ U_{AH} > 0,\ U_{BG} > 0,\ U_{BH} > 0, \text{ and } U_{GH} > 0.$$

To simplify notation, all four goods are measured in units which yield a unit price for each good. Relative prices are assumed to be constant over the period of interest. The rate of time preference is subsumed into the utility function. Subscripts denote partial derivatives with respect to the variable subscripted.

Solving the constraint for private good B in terms of Y and T, substituting the result into the objective function, and differentiating with respect to A, allows the optimal level of private good A to be characterized for a given fiscal package.

$$U_A - U_B = 0 \tag{3}$$

Private good A would ideally be consumed at the level where the marginal utility generated by additional consumption equals the marginal opportunity cost of reduced consumption of B for the combination of government services provided.

The implicit function theorem allows the ideal, perfectly informed, consumption levels of good A and the resulting utility level to be written as functions of the parameters of the optimization problem. The individual consumes in the present according to the following *plan*:

$$A^* = a(\,G, H, t, Y) \tag{4}$$

which yields utility level:

$$U^* = U(\,A^*, Y - A^* - t(G+H), G, H) \tag{5}$$

for given levels of G, H, t and Y. Consuming good A according to plan A* ensures that levels of A and B are those which maximize utility for the existing fiscal parameters.

Now consider the planning problem faced where fiscal information is not costless, and the individual is initially ignorant of public service levels and tax burdens. Knowledge of the existence

of various programs and tax obligations allows fiscal parameters to be guessed at, or estimated, but rational ignorance implies that even the best such estimates will be of poor quality. The conventional Bayesian estimate in such circumstances is based on *diffuse priors* over the unknown parameters. Knowledge of the underlying fiscal relationships allows the tax payer to use the structure of government finance to inform priors on the unknown fiscal parameters.

In the present case, general features of private and government finance allows the domain of the diffuse priors to be characterized. The balanced budget constraint implies that the range of possible tax burdens can be no less than zero and no greater than the (lifetime) income (wealth) of the tax payer of interest. Thus, the prior probability distribution over possible tax burdens is bounded by the 0-Y^o interval, with $f(T) = 1/Y$. It is zero elsewhere. Tax revenue similarly constrains the range of possible service levels than can be funded. The balanced budget assumption implies that public service levels lie between 0 and the maximum allowed by tax revenues. Knowledge of any two fiscal parameters in this implies a value for the third. Different assumptions about public and private budget constraints would impart different but fundamentally similar knowledge of the range of possible values for unknown programs.

Expectations based upon such Bayesian calculations are rational in Muth's (1961) sense insofar as they are conditioned on the *best use* of all the information *possessed* by the individual at the moment of choice. To make the theoretical case for "rational" fiscal illusion as challenging as possible, informed individuals are assumed not only to be able to make efficient and unbiased estimates of fiscal parameters from any information obtained, but perfect ones. The existence of fiscal illusion hinges on whether individuals ever remain completely ignorant of whole policy areas or relevant policy details, and if so whether the resulting estimates are unbiased or not.[17]

As noted above, each combination of public service levels implies a particular tax level, consequently, a tax payer's diffuse fiscal priors to be written as a function of G and H, $f(G,H) =$

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[17] Weaker assumptions would allow "rational" fiscal illusion to arise for reasons other than rational ignorance. Imperfect filters may be adopted as a means of economizing on information processing costs, or because only imperfect filters are feasible. Heiner (1988) discusses why such imperfect filtering and decision making procedures may be rationally adopted. It also bears noting that even "perfect" filtering can yield biased expectations if individuals use Bayesian filters derived using an asymmetric loss function.

$(t^2/Y(Y\text{-}tG))$ within the feasible range of public services (the "o" of Y^o has been dropped to simplify notation).

Note that committing to specific levels of either current or future consumption implies that the other necessarily is undetermined prior to learning the actual tax burden. The natural order of decision making implies that an individual will select a value for current consumption, A, and adjust future consumption, B, as necessary given the tax burden revealed. This assumption implies an expression for expected utility of the form:

$$U^e = \int_0^{Y/t} \int_0^{(Y-tG)/t} U(A, Y - A - t(G + H), G, H)(t^2/Y(Y-tG))) \, dH \, dG \tag{6}$$

Differentiating equation 6 with respect to A and setting the result equal to zero, yields the first order condition that characterizes the level of current consumption which maximizes the individual's utility given his Bayesian fiscal expectations.

$$U^e = \int_0^{Y/t} \int_0^{(Y-tG)/t} (U_A - U_B)((t^2/Y(Y-tG))) \, dH \, dG = 0 \tag{7}$$

Current consumption, A, will be such that the *expected* (or average) marginal utility from current consumption over the range of possible values of government services G and H equals the expected marginal utility of future consumption B. The implicit function theorem implies that the solution to equation 7 can be written as a function of the other choice parameters. Denote A" as the solution to equation 7.

$$A'' = a''(t,Y) \tag{7.1}$$

The expected utility associated with continued fiscal ignorance is equation 6 evaluated at A".

Whether such ignorance is rational or not depends upon the cost of fiscal information. Let C be the price of a single discrete unit of information, and 2C be the cost of perfect information about H and G. Prior to obtaining the information, the range of possible values of G and H is the same as in the uninformed case developed above in equation 6. The mere possibility of purchasing information does not alter one's initial uncertainty about G and H. After purchase of the information, concrete consumption commitments can be made for both private goods according to a variant of plan A* developed in equation 4. Once fully informed, consumption of private good A

can be set according to plan A* evaluated at A*= a(t, Y-2C, G, H) and consumption of good B set to B* = Y - A* - t(G+H) - 2C, according the values of G and H provided by the information.

The *ex ante* expected utility associated with acquiring perfect fiscal information, given the *ex ante* uncertainty about the level of G and H prior to purchasing information, is equation 5 evaluated at A* with consumption set equal to Y - A* - t(G + H) - 2C.

$$U^e = \int_0^{Y/t} \int_0^{(Y-tG)/t} U(A^*, Y - A^* - t(G + H) - 2C, G, H)(t^2/Y(Y-tG))) \, dH \, dG \qquad (8)$$

The magnitudes of equation 6 evaluated at A" and equation 8 determine whether perfect information is worth its cost.

Note that acquiring information is a *discrete* choice in this context. Either one purchases complete information or one does not. One can not purchase infinitesimally small units of all kinds of fiscal information because there is a smallest unit of information that is available. Sample sizes and bits are measured with integers, not rational numbers, Shannon and Weaver (1949).

It is clear that a sufficiently low cost, the individual will purchase information and cease being rationally ignorant. Recall that perfect and costless information always allows one to make plans that are better than those of the uninformed case since U is strictly concave. The expected utility level associated with A" for various combinations of H and G is generally below that associated with A* as long as both A and B are goods in the usual economic sense. Under rational ignorance, A" is adopted whatever the actual levels of H and G. Under plan A*, A and B maximize realized utility for each specific combination of public service levels. This plan allows the benefits associated with perfect information to be appraised in an expected utility sense inasmuch as the probabilities and ranges of integration for equations 8 and 6 are identical.

However, it is also clear that a particular unit of information may not be worth its cost. As the cost of information increases, the expected utility associated with plans based on A* now evaluated at the original income less 2C, declines and eventually falls below that of the original fiscal ignorance case. To take an extreme case, the cost of information may be prohibitive in the sense that its purchase would require reducing current and future consumption levels to zero. In this case, there would be no possibility of using information about government service levels or taxes to improve one's planned consumption of private goods. *Continued ignorance can be rational.*

Appendix B: Intermediate Levels of Rational Fiscal Ignorance

Rather than choosing to be completely informed about fiscal matters, individuals may choose to become informed about a subset of fiscal policies. In the context of the model, this is a matter of the whether the expected utility levels associated with knowing G, H or T exceed those associated with complete fiscal knowledge and continued rational ignorance of these parameters. Purchasing information about a single fiscal variable reduces, but does not eliminate, uncertainty about marginal rates of substitution, since these depend on the service levels of all goods. This section of the paper characterizes the expected utility levels associated with intermediate levels of rational ignorance.

Consider the purchase of perfect information about government service level G. Knowledge of service level G reduces, but does not eliminate, uncertainly about possible tax burdens and about the other service level. Knowing that service level G=Go implies that the tax burden faced will not be less than tGo nor be greater than Y. Consequently, service level H necessarily falls between 0 and (Y-tGo)/t. Knowledge of service level G=Go, thus implies diffuse priors, f(H|Go) = t/(Y-tGo), over H between the minimum service level, 0, and the maximum possible given the institutional arrangements, (Y-tGo)/t.

Let C be the cost of obtaining information about service level G. The expected utility associated with learning that G = Go is:

$$U^e = \int_0^{(Y-tGo)/t} U(A, Y - A - t(Go + H) - C, Go, H)(t/(Y-tGo))\, dH \qquad (9.0)$$

Denote as A^G, the utility maximizing level of private good A obtained by differentiating equation 9 with respect to A and finding the consumption level of A which sets the result equal to zero.

$$A^G = a^H(t, Y, G) \qquad (9.1)$$

Plan A^G differs from the complete ignorance plan, A", because its value changes according to the value of G rather than being fixed for all G and H. It differs from plan A* in that it is fixed with respect to values of H. Prior to obtaining information about G, the range of possible service levels that may be revealed by the information is the same as the range of service levels in the original complete uncertainty case. Consequently, the expected utility of information about service level G may be obtained by replacing contingent plan A* in equation 8 with plan A^G.

$$U^e = \int_0^{Y/t} \int_0^{(Y-tG)/t} U(A^G, Y - A^G - t(G + H) - C, G, H)(t^2/Y(Y-tH))) \, dH \, dG \qquad (10)$$

In the costless information case, the utility level associated with plan A^G can be no lower than that associated with plan A" and no greater than that associated with plan A*. The expected utility of obtaining information about service level G falls between the perfectly informed and original uninformed cases. As information cost, C, increases, the value of plans A* and A^G diminish. An intermediate level of fiscal ignorance will be chosen in the range where the expected utility of plan A^G exceeds that associated with plans A* and A" as characterized above.

Two other intermediate plans are possible. Plan A^H is based on knowledge of service level H. Plan A^T is based on information about tax burden T. Knowledge of service level H=Ho implies diffuse priors, $f(G \mid Ho) = t1 / (Y-tHo)$, over G, and expected utility:

$$U^e = \int_0^{(Y-tHo)/t} U(A, Y - A - tHo - t(G+H) - C, G, Ho)(t/(Y-tHo)) \, dG \qquad (11.0)$$

Differentiating equation 11 with respect to A and finding the level of A which sets the result equal to zero allows us to characterize plan A^H, which specifies consumption levels of A according to the values of H revealed by the fiscal information.

$$A^H = a^H(t, Y, H) \qquad (11.1)$$

The expected utility associated with knowledge of service level H is found by substituting A^H into equation 8, and integrating with respect to G and H.

$$U^e = \int_0^{Y/t} \int_0^{(Y-tH)/t} U(A^H, Y - A^H - t(G + H) - C, G, H)(t2/Y(Y-tH))) \, dG \, dH \qquad (12)$$

Alternatively, an individual might invest to learn his precise tax burden, T. Tax information allows an individual to know his private budget constraint but leaves the marginal utility of private consumption goods unknown if government services are complements or substitutes for those goods. Knowledge of tax burden, T=To, implies diffuse priors over government service levels within the bounds of public revenues, $f(G \mid To) = t/To$, and an expected utility of:

$$U^e = \int_0^{To/t} U(A^*, Y - A^* - To - C, G, To/t - G)(t/To) \, dG \qquad (13.0)$$

Under this scenario, levels for both private goods can be set with complete certainty, although the optimal mix remains uncertain insofar as these depend upon actual service levels of G and H. Differentiating equation 13 with respect to A and setting the result equal to zero allows one to characterize the optimal consumption level of A for given tax information, denoted as A^T.

$$A^T = a^T(t, Y, T) \tag{13.1}$$

The expected value of tax information is obtained by substituting A^T into equation 13 and integrating the result with respect to T over the range of possible tax levels, here from 0 to Y. Diffuse priors over the range of possible tax burdens implies a probability density equal to $1/Y$ within the relevant range and an expected utility equal to:

$$U^e = \int_0^Y \int_0^{T/t} U(A^T, Y - A^T - T - C, G, T/t - G)(t/YT)\, dG\, dT \tag{14}$$

The relative value of different bits of fiscal information is a matter of the magnitudes of the expected utility levels associated with plans A^G, A^H, and A^T, as developed above in equations 10, 12, and 14. These equations characterize the value of the *expected best use* to which perfect knowledge of an initially unknown value of G, H, or T can be put. The informational choice that sustains rational ignorance remains a discrete choice.

Since any positive sample size, or purchase of information, has been assumed to imply rational expectations about the relevant fiscal parameters, fiscal illusion is possible only if the individual chooses to remain rationally ignorant, and if rational ignorance implies biased estimation.

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Figure 1