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WHERE DO WE GO FROM HERE IN RISK ANALYSIS FOR POLICY FORMATION?

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In standard consumer theory, the introduction of changing tastes does much damage to the theory. Indeed, there is much that is lost if one assumes that the distribution of tastes across individuals is not stable. The Chicago view, as I understand it (Becker), is that we should try our best to explain phenomena with changes in opportunities. The difficulty with expected utility is that intrinsically subjective opportunities and incentives are introduced into the theory. This makes measurement very difficult to model and understand. Indeed, unless there is some clear linking of market events with subjective probability distributions, how one does market level welfare analysis is unclear. Thus, the challenge for agricultural policy analysis is to attempt to find well substantiated micro and macro level regularities in behavior. These regularities may be very different in macro and micro level data even when microtheory works well in describing microbehavior. This accounts for the dissimilar views among macroeconomists that the macro should have strong micro foundations or alternatively that aggregation ruins any micro regularities one might observe.^{1/}

As one surveys positive economic studies at the market level which use risk concepts, one sees a surprisingly sparse set of studies. That is, one sees many econometric studies of commodities that incorporate some scheme for expecting the location of some random variable but little beyond that. Perhaps little is needed beyond this. Perhaps, the measurement problems mentioned above make market level detection of risk response difficult to find. Perhaps, we have not tried hard enough. It is interesting to look for the same type of studies at the farm level. One sees a few more, but still the level of knowledge concerning response to risk is extremely small and unconvincing.

My task today is to try to provide some modest means for promoting discussion and ideas for integrating risk into the economic analysis of agricultural policy. I will include some comments on methods of analysis (as usual).

The Distributional Issue

Though the distribution of income is often of primary concern in economic analysis (and should be), I refer in this section to how changes in the distribution of random variables across individuals make aggregate response very difficult to measure. In Figure 1, two firm's supply curves are shown graphed with expected price on the vertical axis. Let p_1 and p_2

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1 Probably Barro would be at one end of the spectrum and Sims at the other end.

be the respective expected prices of the two firms. The firms could be risk neutral or not. What we seek generally to do is to fit an aggregate supply curve (the sum of the two firm's curves) with a scheme for a single index for expected price. As noted, the point p_a satisfies the requirement to add up supplies while averaging p_1 and p_2 . However, difficulties arise when firm level prices change. Indeed, there may not exist a new p_a (average of prices) which will lead to an upward sloping supply curve as indicated. It could be negatively sloped, it may not satisfy the usual homogeneity requirement and it certainly may not resemble the micro-supply curves even when all firm level supply curves are identical. This highlights the difficult nexus between firm level and market level knowledge. Indeed, in many cases, it is not possible for the market or aggregate level data to follow microtheory even when microunits do.^{2/} Indeed, it is clearly possible that much of what we call risk aversion in econometric studies could come from changes in the distribution of expectations across individuals. Such criticisms are not new but seem to be summarily discarded by those working with both types of environments.

What can be done about this problem? It is clear that only studies aimed at the distribution of expectations will be able to uncover the changes in aggregate response. Thus, it would appear that panel data on expectations would be useful. Only then could one untangle the many sources of changing incentives and opportunities. Only in this way could we understand how policy affects expectations. In this context, it is my impression that there is less known about how future's markets assimilate information than is known about the stock market.

Second Best Policies

There is a rather well developed literature on second best policies under various criteria. This is most evident in the trade and public finance literature (Caves and Jones, Atkinson and Stiglitz). Some of these arguments have been extended or applied to agriculture (e.g., Chambers, Gardner), but I think that there is more that can be done here. For example, the Gardner paper considers the maximization of welfare subject to a given cost (dead-weight loss). Standard surplus measures are used to measure welfare. This seems like a pragmatic approach which is worthwhile in designing policy. Assuming that supply curves are properly specified as ex ante and demand curves are ex post, these surplus measures are exact under constant absolute risk aversion. However, under risk aversion, changes in the target price will shift the supply curve. Suppose that firms are risk neutral and consider a pure target price, with mean p_t . The expected transfers (rents) to agriculture are $p_t abp$ moving from the market equilibrium, p , to p_t . However, under risk aversion, the

 2 This is discussed in Pope and Chambers. Essentially, a single index cannot handle adding up of supplies and conform to the usual microtheory assumptions. That is, supplies and demands are not homogeneous of degree zero in this index and input prices.

supply curve will shift right to S' and rents change to p_{tclbp} . The dead weight loss is bad for the risk neutral case. The welfare change for the risk averse case is $bkl - ckn$. The total government transfer changes from p_{tadp_n} to p_{tcnp_c} .

As is clear, welfare could possibly be improved because uncertainty was reduced. As is clear, the magnitude of the supply shift (risk response) is crucial as are the elasticities of the supply and demand curves. However, another important aspect of the analysis is that there are dead weight losses from tax collections also. Further, taxpayers have gone from the certainty of zero transfers to a large expected transfer. Thus, welfare is likely lower than indicated earlier. This highlights the potential failures of policy analysis unless risk to all parties concerned is properly accounted for. Properly accounting for all risks would be important both for conventional welfare analysis or for the cost of a unit of transfer advocated by Gardner. The latter would consider the ratio $p_{tclbp}/(bkl - ckn)$. However, futures markets and storage are crucial extensions of the analysis for any careful welfare analysis. The question remains whether we can do serious aggregate policy analysis under risk. It has not been demonstrated that the impediments mentioned above can be surmounted.

Rent Seeking

Suppose that there is no demand or supply uncertainty but there is uncertainty about whether the support is to be enacted. Let the probability that the bill will pass be $p(x)$, where x is some control variable with unit cost, c . Let $R = p_{tabp}$ be the rent if the price support is enacted. The expected rent is $p(x)R$ and the expected return from lobbying is $p(x)R - cx$. Assuming risk aversion and independence of x and other market decisions, the optimal x , x^* , is characterized by

$$(1) \quad p'(x)R - c = 0.$$

Again using expected surpluses as a welfare measure, the dead weight losses are expected to be $p(x^*)bad + cx^*$. Therefore, ex ante, welfare would not be measured by bad but must be adjusted up or down. As for ex post evaluation, if the legislation is enacted, the welfare loss is $bad + cx^*$ which is clearly underestimated by bad . If the legislation is not passed, the ex post welfare loss is cx^* . In any event, there is no way for the diagram in Figure 2 to indicate welfare changes.

There are many embellishments to the above arguments which one might make. Uncertainties associated with supply decisions would imply that welfare could more appropriately be measured with option type concepts. It may be that collective action by producers and consumers provides valuable information which legislators would otherwise not possess. That is, lobbying could be the least cost way of providing social information. However, this seems quite unlikely.

In spite of this simple example and the limitations noted above, some important ideas emerge. First, the rents to agriculture become costs so

that any threat to undo the policy once it is passed, would not leave agriculture at the status quo. Someone would have a substantial wealth reduction. Secondly, the rather constant legislative attention to a farm bill, causes many resources to be devoted to rent seeking or the blocking of rent diminution. If it were possible to decide on a rule for the rents and the rule had a credibly long life, these rent seeking resources could be devoted to alternative productive uses. Also, the bidding (lobbying) process for rents depends on the market structure. If the rents were not unique to the commodity but were held out to many possible commodity groups such that the total of agricultural transfers were fixed, this would lower the probability that any one group would be successful but there might be more rent seeking expenditures in total.

All of this suggests that policy analysis should include possible losses due to lobbying and rent seeking. In addition, I believe that there are other insights found in the public choice literature that should be considered here. For example, one is often struck with the often conflicting and complex policies in agriculture. Could it be that complexity itself is an end rather than merely the outcome of efficient policies or diverse or imperfect policy goals? Quandt and Kearn suggest that it might be in the interest of intermediaries to seek complexity if it raises the demand for their services (it also increases the intermediaries' costs). Alternatively, asymmetric information may make it a dominant strategy to seek complexity due to the rational ignorance of consumers.

An interesting aspect of agricultural policy is that it is remarkably similar across a number of developed countries. Often, the same commodities are protected with about the same rate of protection (Johnson). Further, some commodities are not protected. If one is to explain policy with public choice arguments about how rents are concentrated among a relatively few while costs are broadly distributed, this must be a consistent paradigm across countries for a given commodity and across commodities within a country. Perhaps, game theory with a collusive or Nash equilibrium would lead to this outcome or perhaps atomistic behavior is similar due to similar environments? Yet, I have not seen a study which provides a convincing explanation.

Experimental Economics

As indicated earlier, risk poses many difficulties for both micro and market level analysis. There are inherent difficulties in cleanly doing market level analysis. Yet, one can't help but wonder how much we know about the micro response to risk. A number of regularities have seemingly been observed which expected utility cannot adequately deal with (Machina; Lee, Brown, and Lovejoy). At this point, there are many theoretical attempts to reconcile these anomalies without a clear consensus. Two general findings in this literature are: (a) individual behavior may appear rather chaotic, yet stable and predictable market outcomes are observed, and (b) some of the most basic and intuitive propositions about individual response to risk are systematically violated (Kneisler, et al.; Levy and Rappaport).

As for (a), it appears that some of the explanation hinges on the notion that it is the marginal actors in the market that determine outcomes. Secondly, often learning is important. Indeed, it appears that a rational expectations equilibrium emerges in experimental markets even though individual behavior is better described by dynamic behavior that is more adaptive in nature. That is, some dampened or inertial behavior is implied which converges to the rational expectations equilibrium.

Regarding (b), the most convincing and disturbing study is found in Levy and Rappaport. The basic mean-variance portfolio model was tested. There were two risky assets and one safe asset. The participants were told that the risky returns were drawn from normal distributions and given means, variances, and, where applicable, covariances. Each participant was told the probability distributions and explained what they meant. Each participant played the investment game with significant amounts of real money and for many trials. The findings were: (a) the separation theorem didn't fare well, (b) reducing the covariances didn't seem to increase the desirability of the risky portfolio, (c) when the safe asset was eliminated, the participants didn't respond to variances and covariances as predicted by theory and intuition, and (d) participants followed rules of thumb instead of the optimal buy and hold strategy. That is, they followed strategies like "if returns were 'high' two times in a row, I sold the asset and chose another." Thus, the proverbial "law of averages" seemed to be a dominant theme. In spite of the fact that there were no trends or serial correlation in the data and they were told this prior to the game, participants saw trends in the data. Even in follow up discussions and the presentation of the data, participants could not recognize the truth. This suggests that we may not be skilled in determining probability distributions from historical data.

The bottom line seems to be that we may not understand very much about micro level behavior. Thus, the normative farm studies may have normative significance but not positive economic meaning. Market experiments involving agricultural policy, information, futures markets, and market structure would be feasible and instructive. All of the curves and welfare measures in Figure 2 would seem possible to determine experimentally. The welfare triangles could then be calculated and compared with the elicited "willingness to pay" for the policy.

Decoupling

The central focus of the current policy debate seems to be decoupling (Choices). That is, transfer payments should not be tied to size (or at least current or recent production, Economic Report of the President). Not only are budgetary pressures large, but the program leads to large distortions by increasing production and stocks. It is clearly possible and even likely that farm programs have changed significantly the distribution of farm income-skewing it towards the upper income groups and farm sizes. Indeed, reductions in risk may be a significant explanation for increasing farm size. These structural changes and the fact that recent changes in the programs have made the payment limitation ineffective or nonoperable have spawned interest in detaching the payment

from size and targeting payments toward "need". Many of the possible approaches for decoupling may have a significant effect on efficiency. If payments are targeted towards those with high debt/equity ratios (to enhance survivability), one will get an effect similar to the Averch-Johnson effect in public finance. The marginal benefit of financing capital out of debt instead of equity will rise with the accompanying consequences. If a fixed payment is given to the base acreage regardless of what is produced on the land, then asset values might continue to fall if world prices continue to fall. However, land would not be farmed as intensively. This presumably is good in light of agricultural surpluses. However, this policy would reduce the marginal benefit of exiting the industry. Finally, one could define need based upon wealth or income. There are problems associated with either of these. Also, income should be thoughtfully defined. For example, large write downs of capital would reduce income and qualify for subsidies. This policy would also reduce labor incentives via the income effect. This effect is perhaps larger when agricultural production income is uncertain. Yet, this negative income tax method would likely have the least distorting effect.

Miscellaneous Concluding Remarks

It would appear that the Profession could do more direct elicitation of policy preferences of various interest groups represented in Figure 2. For example, perhaps we should be less skeptical of the value of questionnaires about policy. Perhaps, a concerted effort could determine how consumers feel about various policy options. It seems quite clear that many of the interest groups have given some indication that either they or we are confused (Spitze). Likely, a study of values regarding agricultural policy would be very helpful. If there is existence value for family farms, that is quite different from existence value for the current farmers on those farms. We seem bent on conferring rents on land. Thus, landowners likely receive a majority of the rents from the policies. Given the large amount of absentee farming in this country, this may have unintended consequences. If it is felt that current owners have a property right to particular asset values, they could be bought out. If they feel that the sector should have more resources for national security reasons, this could be determined. Or, perhaps it is stability that is the reason for the policy. It may be a sort of altruism or merely rent seeking on a part of producers. The key to eliminating some of these arguments is the preferences held by the public. Perhaps, we would be better off to shed some of our innate prejudice against survey instruments. They have a time honored tradition in sociology and political science.

Finally, the risk sharing aspects of various policies should be studied. There are policy risks, tax payer risks, consumer, third party risks and farm risks for virtually any agricultural policy. We need to assess the costs and benefits in a risk/benefit framework. This will be especially difficult to do at the market level because of aggregation and conceptual issues. Clearly, the effect of policy on representative firms is much easier to study but this is only a small part of public concern.

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Figure 1. Diverse Expectations

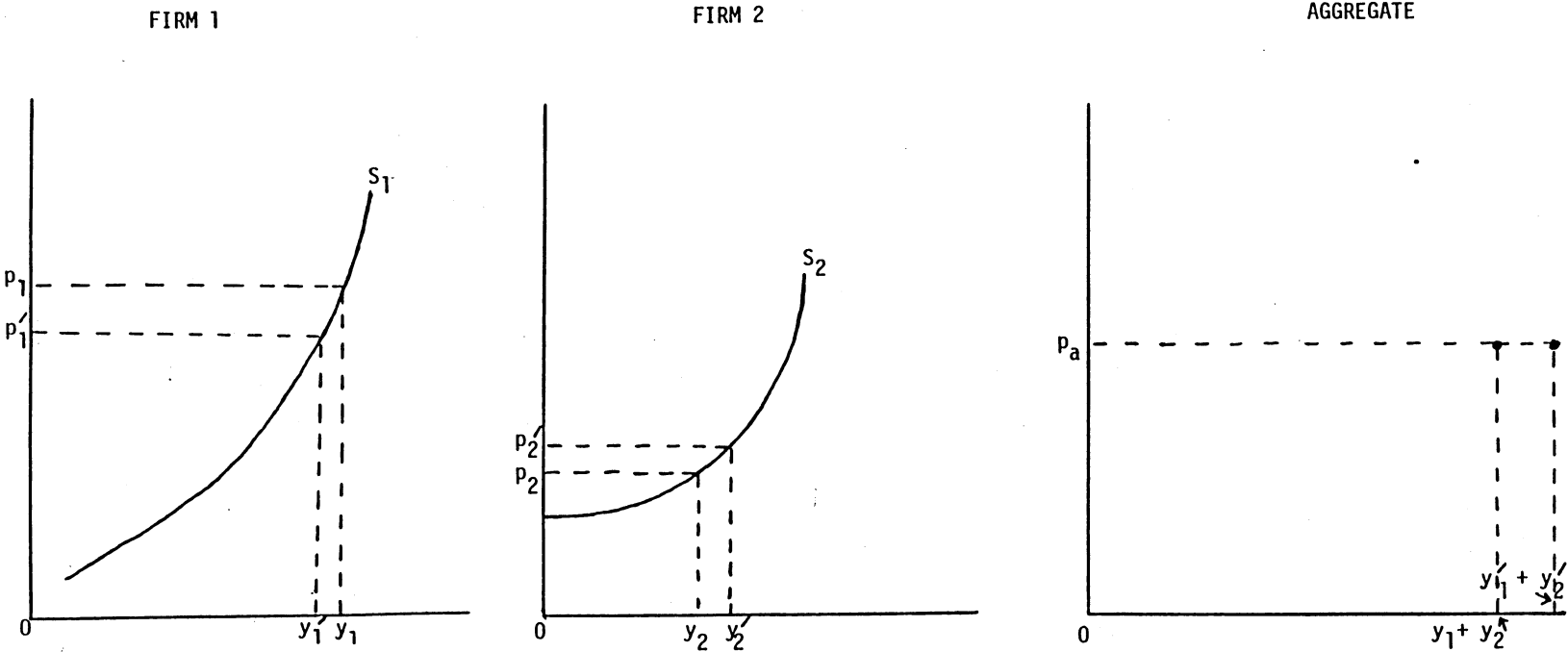
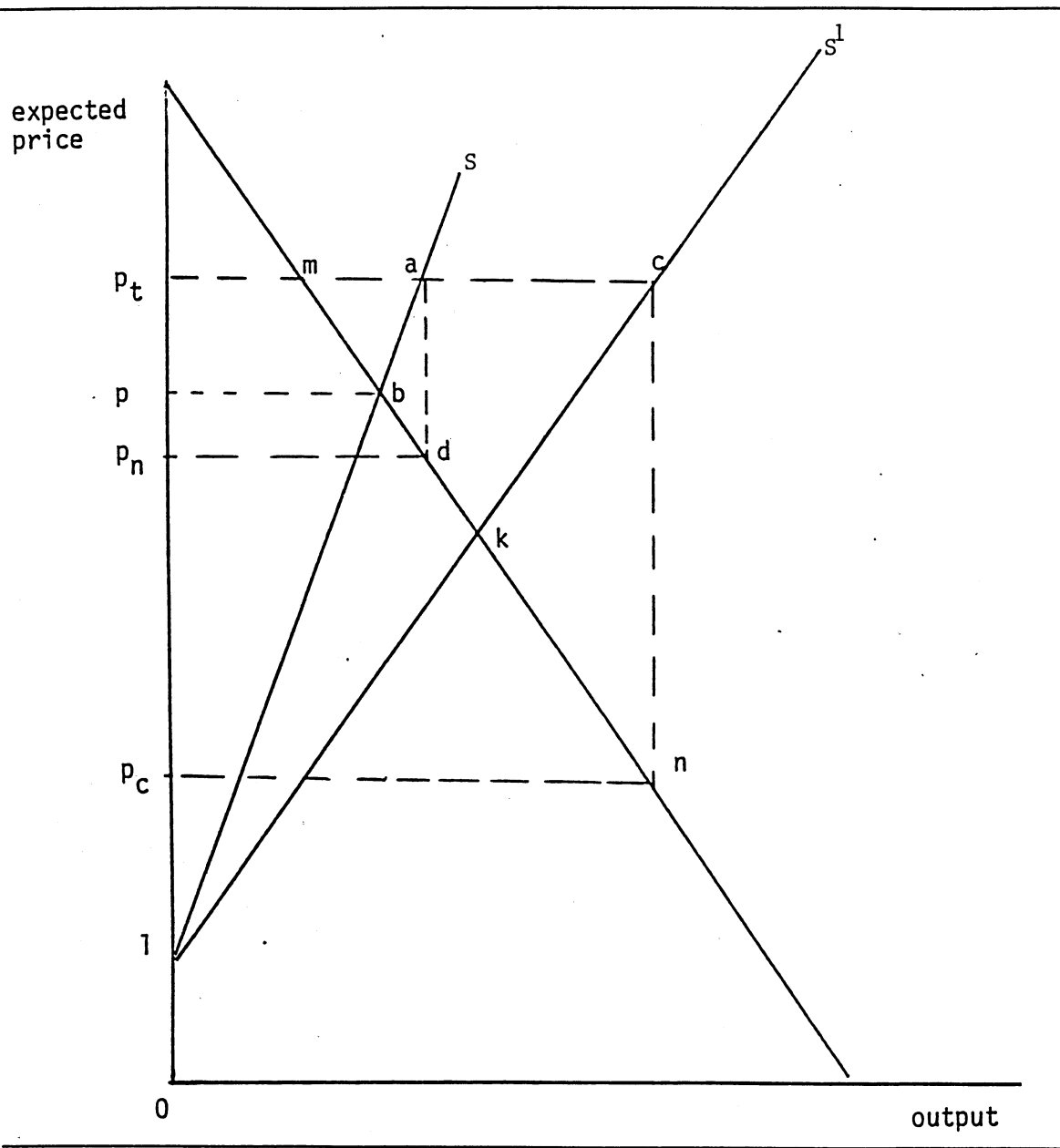


Figure 2. Target Prices and Social Accounts



rents-risk neutral = $p_t abp$

rents - risk averse = $p_t clbp$

dead-weight loss-risk neutral = bad

dead-weight loss-risk averse = $bk1 - ckn$