

The Back of the Invisible Hand: The Costs of “High-Powered”

Incentives When Markets are Incomplete^{*}

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The collapse of the centrally planned economies of Eastern Europe has cast a shadow over public advocacy of socialism and led at least some scholars to accept the capitalist order as the “end of history.” It is often argued, moreover, that the *intellectual* argument for capitalism over socialism has been conclusively established as well (see, for example, Rorty (1992)). My purpose in this paper is to take a closer look at a key component of that argument, having to do with the role of markets in providing targeted incentives.

The claim at issue is that socialist economies, even “market-based” ones along the lines envisioned by Oskar Lange and Abba Lerner in the early rounds of the “calculation debate,” cannot provide material incentives for all activities bearing potential utilitarian value. The reasoning behind this claim, first advanced by the “Austrian” school of economic thought, is that any system of material incentives designed “from the top down” must be based on the knowledge of those at the top rather than the infinitely-dimensioned and ever-changing information about economic opportunities held dispersed across all individual actors in the economy. Spontaneously generated market activity, in this view, alone has the power to match incentives closely to individual opportunities and thus promote the optimal level and mix of productive activity.

This position suggests that market activity of the unplanned sort is generically desirable, and implicitly that more markets are better than fewer. This is the claim I seek to question in this paper. Granting that market competition provides targeted inducements for *particular* patterns of activity, I want to argue that there is an important caveat to the notion that the *particular* array of inducements emerging from a private market system is necessarily optimal.

This is not an unfamiliar argument, of course, when presented as analyses of “market failure.” These analyses suggest a potential role for government in modifying the array of incentives provided by markets. But I want to advance the somewhat more insidious claim that under some conditions the existence of markets itself may be a source of welfare failure, so that having more markets may mean less desirable social outcomes.

Specifically, I’ll demonstrate in what follows that if markets are *incomplete*, such that it is infeasible or undesirable to have market competition for all potentially desirable productive activities pursuable within an economy, then increasing the number of markets may easily reduce social welfare. Furthermore, the welfare losses from these additional market incentives may take the essentially *invisible* form of indirectly reducing incentives for activities that have no explicit price and yet have social value. It is not at all obvious how governments could address such perversities short of qualitatively limiting the scope for market activity.

That said, the normative consequences of this analysis are as yet unclear, since the model discussed below does not indicate *which* subset of productive activities should be removed from the scope of the market, though I have some subsidiary comments to make in that regard. Nor can this analysis establish a compelling “second-best” claim that having no (or very few) markets is superior to having unrestricted avenues of exchange. However, the argument is sufficient, I think, to challenge the central assumption behind the Austrian claim that markets are presumptively desirable just because they finely tune the incentives for individual action.

The Austrian Case for Unplanned Markets

The “calculation debate” concerning the practicality of socialism is sufficiently well-known that it needs no rehearsal here (see Roemer (1994) for an overview). I want to focus on one particular aspect of that debate, involving the Austrian response to the notion that markets might be used as a mechanism to implement the objectives of a central planner. In a seeming irony, this notion was based on the properties of a *capitalist* economy as viewed through the particular lens of the neoclassical model of perfectly competitive markets (see Lange and Taylor (1964)).

The response of the Austrian school, advanced in particular by Friedrich Hayek, is that this notion is based on an essential misconception of the role of market competition. According to Hayek, the implementation of optimal social outcomes is not simply a matter of selecting the “right” prices to guide individual actions, since no one person has the information necessary to determine what is “right” in this sense. The requisite information, which signally includes “knowledge of people, of local conditions, and of special circumstances” (Hayek (1980), p. 80) is necessarily dispersed among individual economic actors, and there is no practical way for a planner to elicit the information required to allocate scarce resources under complex and ever-changing conditions.

The upshot of this, according to Hayek, is that spontaneously generated markets play an unsimulatable role, not just in providing incentives for productive activity, but in signalling *which* activities might profitably be pursued given market opportunities and individuals’ private knowledge:

The point to keep constantly in mind is that *all* economic adjustment is made necessary by unforeseen changes; and the whole reason for employing the price mechanism is to tell individuals that what they are doing, or can do, has for some

reason...become more or less demanded. Adaptation of the whole order of activities to changed circumstances rests on the remuneration derived from different activities being changed...The term 'incentives' is often used in this connection with somewhat misleading connotations, as if the main problem were to induce people to exert themselves sufficiently. However, the chief guidance which prices offer is not so much how to act, but *what to do*.

An updated and closely reasoned version of Hayek's argument is advanced by Joseph Stiglitz (1994) in his assessment of the prospects for socialism "after the fall." Stiglitz agrees in particular with the necessity of providing decentralized incentives through spontaneously generated competition, and emphasizes the inability of market socialism to promote optimal innovation, since it is impossible for planners to know which as-yet-uncreated products are best to pursue in light of their opportunity costs. While Stiglitz makes clear that market failures connected with incomplete markets and asymmetric information also challenge the neoclassical view of competitive markets, he argues that the market socialist position (as conceived by Lange, Taylor and Lerner) sustains the most damage.

Granting that decentralized markets provide high-powered and finely-tuned incentives does, not, however, automatically yield the normative conclusion asserted by the Austrian position (or the more sophisticated version developed by Stiglitz). An additional assumption is required, to the effect that the powerful incentives thus engendered promote activity that is on balance socially desirable. This is the point I want to examine more closely. The key argument made below is that if markets are necessarily incomplete, then having more market incentives may reduce net social welfare by draining incentives for other socially desirable actions.

Multidimensional Effort and Incomplete Markets

Some sense of the point I want to make can be gleaned from a timely example reported in the U.S. press. I quote from an account given in the *New York Times*:

Two studies...suggest that flaws in the treatment of kidney failure may endanger thousands of Americans. Both concern dialysis, the treatment given several times a week to cleanse the blood of waste products that build up when the kidneys do not work. The first report... found that people with kidney failure who had dialysis at for-profit treatment centers were 20% more likely to die and 26% less likely to be referred for a transplant than patients treated at non-profit centers. Two-thirds of the 200,000 Americans on dialysis are treated at for-profit centers, which have come to dominate the dialysis industry in the last 25 years. The researchers...speculated that for-profit centers might be cutting corners in ways that harmed patients, and failing to recommend transplants in order to hang on to customers and keep dialysis payments coming in (Grady (1999)).

What policy implications might be drawn from these studies, assuming their results (and the researchers' speculations as to underlying causes) are valid? It is not necessarily the case that for-profit dialysis centers should be eliminated: on one hand, profit incentives may increase the net supply of dialysis, and patients would presumably prefer *some* dialysis treatment, or dialysis treatment on a timely basis, to infrequent dialysis or no dialysis treatment at all.

In addition, the results of the studies might be taken to argue for tighter regulation of for-profit dialysis services, rather than for their elimination. If appropriate regulation were possible, then the provision of these services by profit-driven organizations might create greater supplies at no net cost in quality of the services provided.

The possibility remains, however, that allowing the existence of profit incentives for the provision of dialysis services may reduce social welfare. This would be the case if the *net* supply elasticity of for-profit dialysis services (net, that is, of non-profit services they might replace) is sufficiently low, and it were not possible to find out *where* for-profit centers were “cutting corners” or *to what extent* these centers were illegitimately “hanging on to patients” for billing purposes rather than recommending transplants. The latter scenarios correspond to the condition I’m calling “market incompleteness,” in that contractual terms cannot be written to govern conditions that can’t be observed by all parties to the dialysis transaction.

In other words, if contracts or markets are necessarily incomplete, it may be that in motivating *some* dimensions of socially desirable activity (in this case, the quantity of dialysis services provided), market inducements may *diminish* incentives for other dimensions of socially desirable activity (in this case, provision of appropriate dialysis treatment and timely recommendation of patients for transplant) that can’t also be given pecuniary inducements. Note with respect to this example that simply setting “quotas” for transplant recommendations may reduce social welfare still further medical information unavailable to the quota-setter is necessary to determine those patients most eligible for taking advantage of the highly limited supply of donated kidneys.

In what follows I formalize these ideas using a model of multidimensional incentive provision due to Holmström and Milgrom (1991). A general equilibrium model of incomplete markets would perhaps be more appropriate to the analytical problem at hand, but the multi-task incentive framework they consider provides a useful shortcut for thinking about the issues involved.

Therefore, consider the situation faced by a representative economic actor who chooses an n -dimensional vector of activities or tasks t given a utility function of the form $U = y + u(t)$, where y is money income and twice-continuously differentiable $u(t)$ represents the utility of the tasks performed. Suppose that performance of these tasks is not categorically repugnant to the agent, such that the marginal utility of each task is strictly positive if no activities are undertaken, that is $u_i(0) > 0, i = 1, 2, \dots, n$ (subscripts on function names indicate the corresponding partial derivatives). This implies that the agent will undertake some positive amount of each task in the complete absence of pecuniary incentives. I'll assume that u is strictly concave in t .

Suppose now that the agent's money income is derived from selling certain of these activities on the market as services. The key point is that only a strict subset of the agent's activities can be sold in a market. This could be true because of severe informational asymmetries with regard to the activities provided (you can't contract for what you can't see), high transaction costs, "public good" aspects of the service, or perhaps because some activities can't be given *extrinsic* incentives without destroying *intrinsic* incentives to undertake them.¹

Accordingly, let $m = M(t)$ be a vector-valued function with dimension $m < n$, representing the strict subset of activities for which an explicit market exists. The j th element of m is denoted m_j . If p_m represents the vector of prices for marketable services, then the agent's money income from market activity can be given as $y = p_m^T \cdot M(t)$. I'll assume for convenience that this is the agent's only source of market income.

¹ Deci (1971) studies possible tradeoffs between extrinsic and intrinsic incentives. Frey () develops an economic model of this phenomenon.

Let's now consider the social consequences of the agent's market and non-market activities. Thus, let the net social benefit of the agent's effort be given by $W(t) = B(t) + u(t)$, where $B(t)$ represents the net *external* benefits of the agent's actions, assumed to be strictly concave in its arguments. There is naturally a question as to how *social* benefit of the agent's activities is determined, since this must involve the problematic exercise of aggregating individual preferences. Since the issues raised by such an exercise are secondary to the problem I consider here, I'll adopt the unrealistic but highly simplifying assumption that side payments are made by the winners to the losers from any change in an agent's efforts, so that social benefit is represented by aggregate willingness to pay for a given (change) the set of efforts by the agent.

Equipped with this framework, I pose the question raised in the introduction in the following way: supposing that a market for some of the agent's activities exists, does the opening of an additional market necessarily raise social welfare?

Private vs. Social Optimization

Socially optimal effort

Although the socially optimal level of economic activity will typically not be achieved when markets are incomplete, it is useful to establish this level as an analytical benchmark. Accordingly, imagine that the agent's effort vector is chosen to maximize net social welfare $W(t)$ subject to the total time constraint, assuming for the sake of argument that the efforts of all other agents in the economy are at their respective socially optimal levels. An interior solution to this problem implies the first-order condition

$$(1) \quad W_i(t^*) = B_i(t^*) + u_i(t^*) = 0, \quad i = 1, 2, \dots, n.$$

Since $W(t)$ is strictly concave in t by assumption, second-order conditions for a globally unique interior maximum are also assured.

Individually optimal effort

Now consider the representative agent's optimization problem. First note that since the agent is not globally averse to effort, s/he will elect a strictly positive effort vector even in the absence of any market incentives. This "autarkic" effort vector, denoted t_a , satisfies the first-order condition

$$(2) \quad U_i = u_i(t_a) = 0, i = 1, 2, \dots, n.$$

Given the boundary conditions and the strict concavity of u , the first-order condition is both necessary and sufficient for a locally unique interior maximum.

But now suppose that positive market prices exist for m of the agent's activities, so that the agent is given pecuniary inducements in choosing the corresponding effort levels. In this case the agent chooses t to maximize $U = p^T \cdot M(t) + u(t)$ given the time constraint. Since the agent likes income, at least one effort level rewarded by the market will be greater than under autarky. However, given the time constraint, at least one level of effort will consequently be smaller than in autarky.

One possibility is that some or all of the pecuniarily unrewarded effort levels are not undertaken at all, which as discussed below raises the possibility of a particularly strong claim about the undesirability of market incentives. However, since I'm interested in the *marginal* impact of additional market incentives, I'll focus on the less extreme case of an interior solution in effort levels. First-order conditions for this result are given by

$$(3a) \quad p_j + u_j(\tilde{t}) = 0, \tilde{t}_j \in M(\tilde{t})$$

$$(3b) \quad u_i(\tilde{t}) = 0 \quad \text{otherwise,}$$

where $\tilde{t}$ denotes the market-driven level of agent activities. Note a qualitative change in the agent's choice of effort levels, compared to the autarkic case. Since there are positive marginal pecuniary rewards to marketable activities, the agent undertakes these activities to the point where their respective "intrinsic" marginal utility levels are negative. Given strict concavity of u , this implies that at least some market-rewarded activity levels are greater than under autarky.

Given that activities are (perhaps imperfect) substitutes in the agent's utility, at least some unrewarded activity levels will be *less* than under autarky. A strong version of this result is considered by Holmström and Milgrom in their analysis of the multi-task agency problem. They consider a case in which there are just two activities that are perfect substitutes in the agent's utility function, only one of which is observable to the principal. To capture the idea that both activities are socially beneficial but a minimal amount of the first is critical, they assume that marginal social benefits are zero unless the unobservable effort level is strictly positive.

Holmström and Milgrom (1991, pp. 34-35) demonstrate that under the stated conditions, the best thing for the principal to do is offer no targeted incentives at all for the observable activity by the agent; in the present context, that means that no market price should be offered for the observable activity. Since dimensions of effort are perfect substitutes, any positive reward for the observable activity means that the agent will choose to undertake none of the unobserved and thus unrewardable effort, which by assumption eliminates the possibility of achieving any net social benefits.

This result is illustrative but somewhat extreme for present purposes, in that effort levels are *perfect* substitutes in the agent's utility, and *no* social benefit is forthcoming if

the unobservable effort level is zero. Consequently I would like to consider the more general case in which effort levels are imperfectly substitutable in the agent's utility and no one dimension of agent effort is necessary for the existence of a positive social benefit from individual actions.

Specifically, consider the simple case in which $n = 3$ and only activities t_1 and t_2 command a market price. The marginal social benefit of market incentives for a specific activity can be represented by considering the marginal impact of a price increase in the market for t_i , $i = 1$ or 2 , evaluating that price initially at zero.

Standard comparative static analysis with respect to the market optimization problem presented above yields the following results, given strict concavity of $u(t)$:

$$(4a) \quad \left. \frac{\partial \tilde{t}_i}{\partial p_i} \right|_{i=1,2} = \frac{-(u_{jj}u_{kk} - u_{jk}^2)}{|H|} > 0, \quad i \neq j \neq k, \quad \text{and}$$

$$(4b) \quad \left. \frac{\partial \tilde{t}_i}{\partial p_j} \right|_{i \neq j=1,2} = \frac{u_{kk}u_{ij} - u_{ik}u_{kj}}{|H|}, \quad i \neq j \neq k,$$

where $|H|$, the determinant of the Hessian matrix of second partial derivatives of the market objective function, is negative given the strict concavity of u .

We are concerned here with the sign of the comparative static expressions presented in (4b) interpreted for $i = 3$, which indicates the effect of changing market prices on the single activity that is not directly rewarded in the market. Given the first-order condition

$$(3b), \text{ it is readily shown that } \text{sgn}\left(\frac{\partial \tilde{t}_3}{\partial p_j}\right) = \text{sgn}\left(u_{31}\frac{\partial \tilde{t}_1}{\partial p_j} + u_{32}\frac{\partial \tilde{t}_2}{\partial p_j}\right), \quad j = 1, 2, \text{ where the}$$

term in the right-hand side brackets is the sum of price effects on the marketed activities respectively weighted by their utility substitution effects on the unpaid activity.

Since the designation of markets 1 and 2 is arbitrary, we are most interested in the case that price effects on the unpaid activity are negative, no matter which of the first two markets is posited to emerge. Given the assumptions made about u , this is guaranteed if in addition either (a) the cross-price effect between either two marketed activities is non-negative, or (b) substitution effects with respect to the unpaid activity are symmetric (so that $u_{31} = u_{32}$) and the own-price effect for either marketed activity is greater in absolute value than the (negative) cross-price effect on the other marketed activity.

What is the *social* impact of increased market incentives? The net effect of increasing a single market price p_j on social welfare is given by

$$(5) \quad \frac{\partial W(\tilde{t})}{\partial p_j} = \sum_i \left[(B_i(\tilde{t}) + u_i(\tilde{t})) \cdot \frac{\partial \tilde{t}_i}{\partial p_j} \right],$$

evaluated at the activity levels induced by market prices. We want to know under what conditions the marginal contribution of increased market incentives is strictly negative.

Let's focus once again on the case that $n = 3$. Note first that for any given level of prices, $u_3(\tilde{t}) = 0$ according to first-order condition (3b). Next, note that $(B_j + u_j)$ need not be positive for either of the marketed activities, since they may generate *direct* negative externalities. But let us put the latter possibility aside and concentrate on the possibility of *indirect* negative externalities created by drawing incentives away from the socially desirable but unmarketable activity.

Thus, let us suppose that the market price for activity t_2 reflects personal and social marginal benefits of that activity, so that $B_2 + u_2 = 0$. Now let's consider the effect of increasing the price of t_1 above an initial value of zero. Given $p_1 = 0$, expression (5) simplifies to

$$(6) \quad \frac{\partial W(\tilde{t})}{\partial p_1} = B_1 \cdot \frac{\partial \tilde{t}_1}{\partial p_1} + B_3 \frac{\partial \tilde{t}_3}{\partial p_1}$$

by first-order condition (3a). Of course, a parallel expression involving a price increase for task 2 emerges if we switch the market in which price increases while maintaining symmetric assumptions.

Crucially, the sign of the expression for net change in social welfare flowing from increased market incentives is *indeterminate*, depending both on the relative signs of the comparative static ratios and the relative marginal benefits of the respective actions. The key point is that increased incentives in market 1 create an *indirect*, and presumptively *invisible*, negative externality by reducing the individual's incentive to undertake the activity that receives no market reward.

I note a final interesting consequence of the analysis. Suppose now that the market price for activity 1 reflects the *direct* externality created by t_1 . As a result, $(B_1 + u_1) = 0$ at the market equilibrium price. Since $B_3 > 0$, the price in market 1 is still inefficiently high, and there would be an *unambiguous* gain in social welfare by imposing a sufficiently small tax on market 1 income. That is, although the unmarketed activity may be *invisible* or otherwise difficult to reward directly, government may still improve social welfare by reducing the power of incentives for the marketed activity.

Conclusion

Is it always better to have more markets? The analysis presented in this paper suggests that caution is advisable in answering this question, at least when markets are unavoidably incomplete. In that case, the *net* social impact of creating or increasing incentives for a marketable activity is indeterminate, given the *indirect* impact of

reducing incentives for substitute activities which command no market price.

Furthermore, even assuming that the price for the marketed activity reflects all *directly* attributable social effects, government intervention is still desirable to mute the *indirect* social consequences of redirecting incentives.

Of course this does not suggest that the addition of *any* market raises the serious prospect of reducing net social welfare in the presence of market incompleteness. The analysis undertaken above suggests several caveats to such a claim. First, primary substitution effects from introducing another market may simply occur among already-marketed activities rather than for unmarketed activities. Second, the direct social benefits from introducing a new market may outweigh the indirect losses from drawing incentives away from social beneficial but unmarketable activities.

However, this indirect welfare loss is insidious because it is presumably invisible and thus difficult at best to address through targeted government policies, especially if source of market incompleteness also bars the use of pecuniary incentives to promote the unmarketed but socially desirable activities. Furthermore, if net disincentive effects on the latter activities obtain and all *direct* social effects are fully internalized in the prices of the marketed activities, then it always pays for the government to mute market incentives at the margin. In this case the “invisible hand” pushes too insistently in some directions, and needs restraint.

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