THE THEORY OF ECONOMIC POLICY: FROM A THEORY OF CONTROL TO A THEORY OF CONFLICT (RESOLUTIONS)

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The theory of economic policy: from a theory of control to a theory of conflict (resolutions)[1]

Summary. The theory of economic policy has its roots in the contributions of Tinbergen and Theil, who solved the problem of a policymaker aiming to achieve certain values for his policy targets, or to minimize a loss function defined on those targets, by using the available policy instruments. After Lucas raised the issue that the private sector could react to the policymaker's decisions the theory developed by Tinbergen and Theil lost its appeal and most policy problems have been discussed in terms of policy games, thus introducing the possibility of conflicts among different players. The new theory of economic policies revisits the Tinbergen and Theil approach, by applying some concepts and tools introduced by them in order to develop a theory of conflicts, able to assert conditions under which policy neutrality, game equilibrium existence, and policy uniqueness or multiplicity appear.

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1.1.The classical theory of economic policy (Tinbergen): control of a parametric system

The theory of economic policy is the area of economic theory that focuses on the investigation of a policy problem "resulting from the interaction of a policy objective, representing some abstract policymaker's desires, with a policy model, representing the feasible outcomes of policy actions" (Preston and Pagan, 1982: ix)

The theory of economic policy has its roots in Tinbergen's econometric models of the Dutch and the US economy (Tinbergen, 1936, 1939) and was developed by Tinbergen himself when serving as the first director of the Dutch Central Planning Bureau, 1945 on (Hughes Hallett, 1989)

In the early 1950s, in addressing in formal terms the issue of the *controllability* of a fixed set of independent targets by a policymaker facing a parametric context (i.e. facing an economy represented by a system of linear equations) and endowed with given instruments, he was able to state some well-known general conditions for *policy* existence (see Tinbergen, 1952, 1956), in terms of number of instruments and targets. In particular, Tinbergen's classical *golden* rule asserts that a policymaker can reach his (fixed) targets if the number of his independent instruments equals the number of his independent targets. A similar approach was developed by Bent Hansen

[1] This is a modified version of Chapter 1 of N. Acocella, G. Di Bartolomeo and A. Hughes Hallett, Cambridge University Press, Cambridge, 2012.

in the same years (Hansen, 1958).[2]

Tinbergen's theory deserves the merit of having raised the problem of conditions for the existence of a first-best policy, i.e. a vector of instruments ensuring the solution to the policy problem when addressed in its simplest way of fixed targets.

Among the many issues left unsolved by Tinbergen's theory, Theil cited four main difficulties: uncertainty as to data; model uncertainty; uncertainty as to the variables controlled by other decision-makers; choice of target values. In his works Theil gave a solution for most of these difficulties and for others as well. In particular, by prescribing that the policymaker should maximize a preference function (or minimize a loss function) subject to constraints describing the functioning of the economy, he accomplished a number of tasks: he avoided the sub-optimality of an *a priori* choice of target values; he also avoided the difficulties facing the policymaker when endowed with a number of instruments lower than the number of targets; finally, he gave a certain and positive answer to the issue of the *existence* of a solution for the *policy* problem also in non-Tinbergen systems (Theil, 1954, 1956, 1964).[3]

In so doing Theil arrived at a solution of the policy problem formally very similar to that predicated by Ragnar Frisch (Frisch, 1949, 1950, 1957, 1961), who had first conceived policy problems in terms of maximizing a social preference function, derived by interviewing policymakers.

Theil also overcame the rigid distinction between targets and instruments, allowing the latter to be relevant *per se* and directly introducing them into the objective function,[4] and developed the theory of economic policy in a dynamic setting.[5]

Development of the modern methods of control theory[6] complemented this strand of literature to give an apparently very powerful set of instruments for designing and implementing policy issues.[7]

Tinbergen, Theil, and the other founding fathers of economic policy were only partly concerned with analyzing the *effectiveness of specific policy instruments*, which has been raised by the subsequent economic literature with reference to specific instruments, monetary policy, fiscal

[2] As Petit (1990: 5) reminds us, the Swedish edition of Hansen's book is dated 1955.

[3] These are systems where the number of independent instruments is lower than that of independent targets.

[4] This, however, may be necessary partly because of a misspecification of the objective function (Petit, 1990: 148).

[5] Hansen (1958) also developed a dynamic approach to the policy problem. Further improvements and advancements of the classical theory as to the *existence*, *uniqueness* and *design* of economic policies are due to a number of authors and accounted for in Leontief (1964, 1976), Heal (1973), Preston (1974), Johansen (1977, 1978), Preston and Pagan (1982), Hughes Hallett and Rees (1983) and Petit (1990).

[6] See Bellman (1957, 1961), Kalman (1960), Pontryagin *et al*. (1962), Athans and Falb (1966), Pyndick (1973), Aoki (1976).

[7] These methods proved to be particularly useful in a dynamic setting for finding a unique control path or when the system is not point-controllable, as they enable us to get a second best solution. On differences and equivalences between the Theil-type controllability method and optimal control theory see Hughes Hallett (1989) and Petit (1990).

policy or others.[8]

As said, the focus of the theory was on the general conditions for controllability of an economic system. Existence of at least as many instruments as targets is the simple necessary condition. The necessary and sufficient condition is that those instruments must also be linearly independent.[9] These are rather simple conditions to verify and if they are met, the policymaker has no obstacle in pursuing his objectives, in a system that does not react to his policies.

1.2. Rational expectations and Lucas' critique: loss of control?

The classical theory of economic policy has been the object of fierce criticism from a number of points of view. The introduction of rational expectations led to an assertion of the ineffectiveness of monetary policy that was more forceful than that famously stated by Milton Friedman (see Friedman, 1968) in his 1968 *American Economic Association Presidential Address* (Sargent and Wallace, 1975). In a similar way, with rational expectations fiscal policy was considered to be ineffective on income (Barro, 1974). A proposition of policy neutrality or "invariance" was then stated with regard to two main short run policy instruments.

Apart from the critiques advanced with reference to the effectiveness of specific instruments, the more general and forceful argument was raised by Lucas (1976) according to which the conclusions of a Tinbergen-type decision model are inconsistent with the assumption of rational expectations (REs). The importance of this contribution lied in the fact that it denied the validity of the solution given by Tinbergen, Theil and others to the existence of an (optimal) policy vector (or a sequence of vectors) that can achieve policy targets (or get close to them), assuming the private sector behavior to be invariant to the vector itself. In other terms, when the private sector has rational expectations the policymaker loses control of the economic system, as they imply inexistence of the parametric system facing him according to the classical theory of economic policy.

This implication is apparently easy to understand if one realizes that assuming REs amounts to implicitly changing the nature of the economic system confronted by the policymaker: the private sector has objectives conflicting with those of the policymaker and can somewhat react to his action. The policymaker then faces a system that is no longer parametric and this leads, *per se*, according to Lucas, to a loss of control. However, this implication might not survive an explicit

[8] Hansen (1958) is an exception, as he deals extensively with fiscal policy.

[9] The reason for this more general condition is obvious: the instruments may be sufficient in number but unable to generate separate effects.

statement of the underlying conflict between the policymaker and the private sector. Put differently, this critique might be true of the Tinbergen theory of economic policy. But that is not to say it is also true of a revised or new theory of economic policy, possibly exploiting both Tinbergen and Theil contributions. It all depends on whether the private sector reactions can be accommodated in the policy maker's decisions; or whether the private sector's reactions are strong enough to exactly offset, in their own self-interest, what the policymaker is trying to do. In general, private agents can neither offset those actions completely – nor would they try to do so, as we shall show.

1.3. Policy games and explicit conflicts: results of policy neutrality, but no (general) theory of neutrality

In the 1980s, pioneered by Barro and Gordon (1983), a new approach to the analysis of economic policy was developed, that of policy games, exempt from the Lucas critique. As said above, introducing REs amounts to *implicitly* assuming some kind of reaction of the system to the policy enacted, as a consequence of *conflicting objectives*. This implicit assumption and the underlying conflict between the policymaker and the private sector can be made explicit if the issue facing the policymaker is built in a context (that of games) where the private sector's behavior is explicitly modelled from its preferences. Strategic interaction between the private sector and the policymaker ensures that REs are satisfied.

With Barro and Gordon (1983) the emphasis of the policy debate was still far from the search for conditions of existence of an instrument vector that could guarantee satisfaction of some fixed targets (Tinbergen's fixed-target approach) or an optimal policy that maximizes a given preference function (Theil's flexible-target approach). In fact the Lucas' critique was practically deemed to be destructive of the possibility that the policymaker could control the system. The discussion concentrated instead on issues of the *effectiveness* (or neutrality) of specific instruments when the private sector has some specific target and instrument, continuing in the new setting the debate started in the previous two decades.

Barro and Gordon (1983) studied a (Stackelberg) game between the central bank and the private sector, where the latter is the leader and trades off real wage and employment when setting the nominal wage rate. They then delivered again the well-known assertion of monetary neutrality as a result of the private sector expectations of discretionary monetary policy: the private sector

forms rational expectations and fully crowds-out monetary effects on real output.[10] A superior solution for the public sector is to commit to a rule. The policymaker would always be tempted to cheat and renege on his commitment, because of time inconsistency (see Kydland and Prescott's (1977), in an attempt to pursue a superior outcome. But awareness on the side of the private sector of this possibility would generate worse results that could be avoided only if the temptation to cheat is balanced by the fear of the policymaker to lose his reputation, if the interaction (game) with the private sector is repeated.

With Barro and Gordon (1983) we certainly have a *result* of policy neutrality, but this result is specific to the assumptions of the model. We don't have a *theory* of policy neutrality. A part of the following literature tried to elaborate such a theory in different ways, making no reference to Tinbergen's contribution.

In an influential article, Rogoff (1985) showed that uncertainty can break the neutrality mechanism, in terms of second moments by creating a trade-off between the variances of inflation and output (or employment). In an influential article, Rogoff (1985a) showed that uncertainty can break the neutrality mechanism, in terms of second moments, by creating a trade-off between the variances of inflation and output (or employment). Sargent (1999) also explored the short run trade-off between inflation and unemployment by focusing on uncertainty, specifically on imperfect knowledge and misperceptions by policymakers and/or private agents in a policy game with learning. He showed that the rise and fall of U.S. inflation can be attributed to policy makers' changing beliefs about the natural rate hypothesis. In other words, he put forward a hypothesis that American inflation dynamics can be explained by the Federal Reserve discovering and subsequently abandoning the Phillips curve. In a similar manner, Orphanides and Williams (2002) attributed the volatility and failure of US anti-inflation policies in the 1970s to the Federal Reserve's misunderstanding of the natural rate of output, and hence output gap, on the basis of real time data. Real time data is, of course, the only data available to the policymakers when they have to make their decisions. So these volatility trade-offs will always be present; there is no point in supposing the policymakers used the ex-post data they could not have had at the time.

By introducing nominal rigidities, the New Keynesian School has developed a more refined version of Rogoff's model, where uncertainty derives from the forward looking behavior of the private

[10] See, also Stokey (1989, 1991).

sector.[11] It is worth noticing that, in an influential article, Clarida *et al.* (1999) explicitly mentioned the Tinbergen-Theil approach in illustrating their solution: "This formulation is in many ways in the tradition of the classic Jan Tinbergen (1952)/Henri Theil (1961) (TT) targets and instruments problem. As with TT, the combination of quadratic loss and linear constraints yields a certainty equivalent decision rule for the path of the instrument. The optimal feedback rule, in general, relates the instrument to the state of the economy."[12]

Another interesting line of investigation has followed the idea that neutrality depends on the content of the preferences of the private sector: simple addition to the private sector's preferences of other targets *explicitly* shared with the policymaker would have avoided the neutrality result. Gylfason and Lindbeck (1994) suggested that monetary policy non-neutrality arises whenever the private sector (labour unions) *explicitly shares* the objective of price stability with the central bank in addition to that of the real wage (or employment). Acocella and Ciccarone (1997) generalized the above result by taking into consideration also public debt. Jerger (2002) demonstrated also in a different setting that the traditional paradigm of neutrality does not hold if wage setters are inflation averse.

However, this rule for finding a neutrality result seemed to lose ground when non-competitive markets were introduced into the picture: Guzzo and Velasco (1999), Soskice and Iversen (2000), Cukierman and Lippi (2001), Lippi (2003), Coricelli *et al*. (2006) and other studies[13] showed in fact that non-neutrality of monetary policy can derive from the interaction between imperfectly competitive goods and labour markets even when unions *do not explicitly* share a common objective with the monetary authorities. Acocella and Di Bartolomeo (2004) admitted that also *implicit* addition of shared targets would have the effect of violating the neutrality result: in fact, they suggested that non-neutrality only emerges when unions *share* some targets with the monetary authorities *either explicitly or implicitly*. Only in their conclusions they hinted at a possible explanation in terms of number of instruments and targets of the various players.

1.4. The new theory of economic policy: the classical theory (control) in the new context (policy games and conflicts)

[11] The New Keynesian approach is well illustrated by Woodford (2003) and Galì (2008).

[12] However, as they remark, in New Keynesian models "target variables depend not only on the current policy but also on expectations about future policy" (Clarida *et al*., 1999).

[13] See Cukierman (2004) for a survey.

An advance in the explanation of the neutrality result (and in the theory of economic policy) needed further steps to be taken. This was achieved on realizing that those conditions for policy invariance or, instead, policy effectiveness that were stated by Barro and Gordon (1983) and the articles presenting other policy games reviewed in the previous section hold only under specific circumstances. The general conditions leading to effectiveness or neutrality of the policy of a player might have to do with existence of conflicts on shared targets with other players and the possibility that the player in question has or does not have enough instruments for reaching his targets. This consideration led to rediscovering the requirements for controllability of an economic system asserted by the classical theory of economic policy (Acocella and Di Bartolomeo, 2005, 2006).

For the purposes of illustration, let us refer to a situation in which different players have at least one overlapping target, but they conflict on the precise preferred value of that (or those) target(s), i.e. in their target value(s). Assume that one player, e.g. player 1, controls the economic system, since it has a number of linearly independent instruments at least equal to that of his targets. It is then intuitive to guess (and show) that another player can hardly have an influence on that (those) target(s) if his target value(s) for the common target(s) are different (and it has no enough instruments to control the economic system). In this situation the conflict can be only solved to the benefit of the controlling player and the other player's policies are neutral (ineffective, or invariant) with respect to the shared objective(s). This is the *first fundamental proposition of the new theory of economic policy*.

Proceeding in this way amounted to using the old, i.e. the classical, theory of economic policy in a new setting, that of policy games, which, by assumption, represents a situation of conflicts among different agents. Since the classical theory was a theory of controllability, i.e. of the possibility for one agent, the policymaker, to pursue his objectives, when applied to a situation of conflicts it gave the possibility to specify the conditions under which the conflict could (or could not) be solved to his benefit. From this point of view, the old theory could aim at the role of being a theory of conflict resolutions.

In fact it has been able to explain all the cases of neutrality (or non neutrality) that had been investigated in the literature, from Barro and Gordon (1983) on, in very simple terms, and, as we will see better below, without solving the underlying games (Acocella and Di Bartolomeo, 2005; Acocella, Di Bartolomeo and Hughes Hallett, 2006).

1.5. Applications of the new theory to model building: not only a theory of neutrality, but also of game equilibrium existence, uniqueness and multiplicity

This role of a theory of conflict resolutions was strengthened when it was realized that more than one player could control the. The neutrality result gave an indication of the player in favour of which the conflict could be resolved, i.e. the player controlling the system. When however there is a conflict between two or more players each of which can control it, there is a kind of stalemate and no possibility of solving the conflict along the rules of a simple strategic game arises.

In fact, let us assume that at least two players share at least one target and that the golden rule applies for both. Since each player has at least the same number of instruments as targets, both should reach their objectives. However, if they have conflicting target values, the possibility to further their objectives cannot materialize, as the system cannot admit two different values for the same variable at the same time. The consequence is that existence of the equilibrium of the game requires that two or more players do not satisfy the golden rule. In case of no conflict, i.e. if the players share not only the same target(s), but also the same target value(s), existence of an equilibrium is possible in so far as the objective(s) is (are) concerned, but a problem would arise in terms of instruments. In fact, even in the absence of a conflict, indeterminacy would result as to how to reach the agreed target value(s) and there may be infinite combinations of the instruments of the different players capable of furthering those values. A coordination failure would then arise in this case of no conflict.

Thus, in addition to the result of neutrality (or non neutrality), applying the classical theory of economic policy to policy games can lead to stating the conditions for equilibrium existence (or inexistence) as well as equilibrium uniqueness or multiplicity. These results represent the *second fundamental proposition of the new theory of economic policy*.

All the results concerning the properties of the policy game (i.e. those stated in the two fundamental propositions of the new theory) can be derived in terms of simple rules about the relative number of (linearly independent) instruments and (linearly independent) targets for each player, without solving the game.

They then appear to be particularly relevant from a methodological point of view. To design a viable model, we need a check of *mutual consistency* between the optimal decisions of the agents. In other terms, we need the interaction between the players to guarantee a solution, i.e. equilibrium existence in terms of both outcomes (targets) and strategies (policies). In any game with all kinds of players (all public, all private or both public and private) with overlapping targets,

existence of an *equilibrium of the whole system* must exclude controllability of the same targets by more than one player. In addition, if we want to ensure a particularly important feature of the policy game we are going to build, in the form of some action taken by a player (in particular that player to which – in a narrow definition of economic policy – we want to attribute the quality of a policymaker) to be effective, we need that player only (and no other player) to satisfy the golden rule of economy policy.

1.6. Applications to institution building: centralization and decentralization, hegemony, warfare, implicit coalitions

A change of perspective in looking at the issue of controllability has led to important applications of the new theory of economic policy to institution building.

The perspective used in the initial formulation of the new theory was that of controllability by the single players: if only one player controls, the policies of the other(s) are neutral; if more than one player controls, no equilibrium exists in terms of either outcomes or strategies.

However, one can look at a game from the perspective of groups of players or of the system as a whole. From the former point of view a generalization of the first propositions of the new theory of economic policy has concerned the passage from a situation of conflict among all players to one with no conflict among some players and a conflict persistent among groups of players. A group of players sharing only some target values, while having other not overlapping targets can play in a symbiotic way as a unique player if those players have a total number of instruments equal to their targets. If this is the case, they implement a kind of (implicit) coordination and then act as an implicit coalition. All the results in terms of neutrality and equilibrium existence derived in terms of the golden rule with respect to single players can then be applied to implicit coalitions (Acocella, Di Bartolomeo and Piacquadio, 2009).

One can also look at a game from the latter point of view, i.e. from the perspective of the system as a whole, taking account of the total number of independent targets expressed by the various players and the total number of their independent instruments. From this perspective, it has been shown that in a linear quadratic policy game with overlapping preferences the necessary condition for the existence of the Nash equilibrium is that the total number of instruments available for all the players should not exceed the total number of targets of all the players (Acocella, Di Bartolomeo and Hughes Hallett, 2011b).

This implies the existence of a fundamental asymmetry in institutional solutions: if an economic system is over-determined (i.e., the number of instruments is higher than that of targets), it can be solved by some 'social planner' by taking the exceeding number of instruments over targets as given, whereas a decentralized solution fails to exist. The possible advantages of centralization deriving from the abundance of instruments are lost in a decentralized solution and indeterminacy arises from decentralization, raising a problem of coordination.

This proposition has many practical applications in particular in international economics. The *n*-th country problem (Mundell, 1968) is indeed a specific case in point: no equilibrium exists among *n* countries pursuing independent results in their balances of payments, if all of them make use of an independent instrument, as there can be only *n*-1 independent external balances. The practical solution to non-existence of an equilibrium can then be voluntary giving up of the use of its instrument by some country. As an alternative a situation of economic warfare, possibly leading to other, more cruel, forms of warfare, can ensue.

Even in the case where the contrast among countries is at the minimum level or there is no conflict at all, which happens when their target values coincide, as, e.g., when all of them are interested to stabilize the international monetary system, the need arises of either an international institution that coordinate the countries' policies or a hegemon *à la* Kindleberger (see Kindleberger, 1973) that acts as an anchor to stabilize countries' expectations.

Another institutional implication of the new theory that deserves a mention at this point derives from an extension of the Tinbergen-Theil analysis to dynamic problems in a context where a policymaker interacts with the private sector and REs hold. In fact REs, rather than implying ineffectiveness of policies, will typically help the policymaker to pursue his targets if he makes proper announcements, when some conditions involving possession of enough instruments are satisfied. If this is the case, the policy problem is no longer finding institutions guaranteeing a credible commitment, but of how the policy changes should be announced (Acocella, Di Bartolomeo and Hughes Hallett, 2011a).

1.7. Generalizations and extensions

The two fundamental propositions of policy ineffectiveness and existence of equilibrium refer to Nash policy games as well as any hierarchical equilibrium and are limited to the common case of quadratic preferences and linear constraints. This, however, should not be considered as a heavy

limitation of the theory, since many non-linear models are really approximated in terms of linear models, in order to derive closed-form solutions.

By contrast, the propositions can be easily extended to other richer information structures or model frameworks, without affecting the basic underlying intuition. For instance, if we consider linear-quadratic preferences[14] under linear constraints, the results are only slightly different. By redefining the golden rule in terms of quadratic target variables (i.e. a policymaker satisfies the golden rule if the number of his independent instruments equals the number of his independent quadratic targets), both propositions still hold for simultaneous (Nash) games.

A further generalization has been derived with reference to instruments costs. The classical theory of economic policy admitted the possibility of attributing the instrumental variables a value in their own, for various reasons, such as existence of psychological or material costs tied to their use. This extension can obviously hold also for the new theory of economic policy. However, one must be cautious in implementing this more general way of expressing the policymaker's preferences, as the properties of a policy game would be altered accordingly. In fact, the total number of objectives would be increased by the presence in the preference function not only of the true targets, but also of instruments, implying that the policymaker (or any other player) never controls the economic system, with understandable implications in terms of neutrality and equilibrium existence. Then, inclusion of instrument costs into the loss function should be limited to the cases where the player incurs true losses in gearing his instruments.

1.8. Dynamics: rational expectations, announcements and credibility, time-inconsistency

The results presented above are not confined to statics. They also hold in a dynamic setting, where the propositions on neutrality and equilibrium existence based on the concept of controllability retain their value (Acocella, Di Bartolomeo and Hughes Hallett, 2007). Such results would not be satisfactory, however, in a dynamic context until REs are added to the setting.

Dynamics with REs is in fact *the* critical context for the new theory of economic policy. REs, which were the decisive argument employed to critique the classical theory, pertain to dynamics, which is then the proper field for a decisive test for the validity of the neutrality propositions asserted by the new theory.

[14] By linear quadratic preferences we mean that some (target) variables are second order entries in the player's preference function and others enter it only linearly, i.e. are first order entries.

In this context, it has been shown (Acocella, Di Bartolomeo and Hughes Hallett, 2011a) that policy targets can be controlled, and expectations managed through the policy process, as long as the anticipated and feedback effects of a policy change balance in such a way that there is no policy impact on current outcomes, and as long as the policymaker has enough instruments available for reaching his targets. If the two effects cancel out and the policymaker has no sufficient instruments, the conflict with the private sector cannot be resolved in his interest and policy neutrality holds. But, if this is not the case, REs have no impact on the effectiveness of public policy. Hence REs do not, in themselves, prevent controllability. On the contrary, they can typically enhance the effectiveness of economic policy: in fact, even in the case where the number of instruments is less that of targets, controllability would be ensured with REs if the policymaker is patient and makes proper (credible) announcements of his future policies.

The implications of this result are important in terms, again, of model and institution building. All dynamic problems that imply the achievement of a given target at a certain moment of time –such as fiscal consolidation, or achieving macroeconomic targets in order to enter a currency union – will find an important ally in the existence of REs if a proper number of instruments is available to the policymaker. The policy problem would no longer be a general matter of how to find a credible commitment, but of how the policy changes should be announced given the economy's lag structure, if there are no conflicts between public and private information sets. Hence time inconsistency and the need for a commitment technology may appear in certain cases; but they are far from representing the typical outcome and a necessary requirement.

1.9. Conclusions

The importance of the new theory of economic policy can therefore be summarized in four points.

First, its two fundamental propositions (on policy neutrality and equilibrium existence) appear to be essential for model building, as they state the conditions under which the effectiveness of policy instruments, as well as consistency of the optimal strategies of all the players (and thus the existence of the equilibrium of the game), are guaranteed.

Second, the theory has important applications for devising proper institutions.

Third, rational expectations are not necessarily an obstacle to policy effectiveness. On the contrary, they can enhance it and make debates on time inconsistency and the need for commitment irrelevant when the policymaker and the private sector share the same information

on the working of the economic system. That again carries important implications for the design of institutions and how they work.

Finally, from the perspective of the history of economic thought, it may be important that the theory of economic policy, in going back to the tools devised by Tinbergen and Theil and applying them to a context of policy games, has become a theory of conflict resolution, precisely because it states the properties of the game both in terms of whose instruments are effective and in terms of the conditions for the existence, uniqueness and multiplicity of solutions of policy games.

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