JITE

Journal of Institutional and Theoretical Economics

Zeitschrift für die gesamte Staatswissenschaft

in cooperation with / *in Verbindung mit*

Armen A. Alchian, Eirik G. Furubotn, Terence W. Hutchison,
Heinz König, Ernst-Joachim Mestmäcker, Wolfgang F. Stolper

edited by / *herausgegeben von*

Rudolf Richter

As one of the oldest Reviews in the field of Political Economy (founded in 1844), this Journal deals traditionally with problems of Economics, Social Policy and their Legal Framework.

Papers for publication in English or German should be sent in triplicate to: Professor Dr. Rudolf Richter, Universitätsgebäude Nr. 31, D-6600 Saarbrücken 11, W. Germany. Manuscripts should be typewritten on one side of the paper only, double-spaced with wide margins.
Submission of a paper will be held to imply that it contains original unpublished work and is not being submitted for publication elsewhere. The Editor does not accept responsibility for damage or loss of papers submitted. All articles are refereed by specialists.

Manuskripte in englischer und deutscher Sprache sind in dreifacher Ausfertigung zu richten an: Professor Dr. Rudolf Richter, Universitätsgebäude Nr. 31, D-6600 Saarbrücken 11. Manuskripte bitte nur in Maschinenschrift, einseitig beschrieben, mit doppeltem Zeilenabstand und breitem Rand einsenden.
Es wird davon ausgegangen, daß es sich bei eingereichten Manuskripten um unveröffentlichte Originalbeiträge handelt, die nicht anderwärts zur Veröffentlichung vorgelegt worden sind. Für Verlust oder Beschädigung eingesandter Manuskripte übernimmt der Herausgeber keine Haftung. Literaturhinweise bitte wie im vorliegenden Heft.

Books for review to be addressed to the publisher. *Rezensionsexemplare werden an den Verlag erbeten.*

Subscriptions:

JITE is published in quarterly issues of approx. 190 pages each; annual subscription rate is DM 248,– plus postage.
Please send your subscription order to the Publisher: J.C.B. Mohr (Paul Siebeck), P.O.Box 2040, D-7400 Tübingen, W.-Germany – or to your usual subscription agency.
Back volumes available on request.

ISSN 0044-2550

Journal of Institutional and Theoretical Economics 142 (1986), 571 – 580
Zeitschrift für die gesamte Staatswissenschaft

Short Articles / *Kurzbeiträge*

Where are the Limits of Regulation?*

by

BRUNO S. FREY and HANS JÜRGEN RAMSER

1. Introduction

Regulation is an important part of government activity (STIGLER [1971], POSNER [1971], PELTZMAN [1976]), and there is empirical evidence that its size has strongly increased since World War II (see e.g. PENOYER [1981]). According to BRENNAN and BUCHANAN ([1980], p. 165f.) "it may be persuasively argued that the interferences with personal freedom reflected in regulatory laws ... present more serious issues than the more indirect extensions of governmental powers by means of the fiscal process and reflected in explicit taxation".

There is thus good reason to be concerned about regulation. The issue is well recognized in the literature, but it is curiously silent when it comes to indicate the *limits* of regulation. This silence is all the more noteworthy as the *fiscal* limits of government activity have recently found much attention in the context of the so-called Laffer Curve. When tax revenue is limited either because the tax base shrinks or because constitutional limits are imposed, it is reasonable to assume that government (and public bureaucracy) seeks to reach its goals by turning to regulation. This substitution effect has been mentioned by some authors (e.g. ARANSON and ORDESHOOK [1981], p. 167f.) but the resigned conclusion by BRENNAN and BUCHANAN ([1980], p. 166) still holds true: "There is little that we can do here than to acknowledge the 'limits of tax limits' in this respect".

This paper seeks to show that (1) there are *endogenous limits* to regulation, (2) there is *"overregulation"* (in a way to be defined below), and (3) that the models of the limits of taxation (Laffer Curve) and of the limits of regulation are special cases of a more *general model* in which the government simultaneously taxes and regulates. It is shown that it is possible that government has an incentive to "overregulate" but *not* to "overtax".

---

* We are grateful for helpful discussions to Werner W. Pommerehne, Gebhard Kirchgässner, Friedrich Schneider and Hannelore Weck-Hannemann. B. Frey acknowledges financial support by the Fritz Thyssen Stiftung.

The short and long run limits of regulation are discussed in section 2. The general model of a simultaneous use of regulation and taxation is developed in section 3, section 4 deals with the relationship between the partial models and the general model, and section 5 with the testable propositions that can be derived from our model. Section 6 offers concluding remarks.

2. The Limits of Regulation

We distinguish between the short run as the government's time horizon, and the long run as the period which the individuals (and firms) need to completely adjust to the government's actions. The thus myopic government is assumed to maximize its utility U which depends positively on the amount of regulation R

$$U = (R), \quad U' > 0, \quad U'' \leqq 0 \; . \tag{1}$$

The government is able to control the *intensity* of regulation ρ, i.e. the number of regulatory acts for a given range of economic activities, but not the *range* B over which the regulatory acts are observed. To give an example for the concept of the "intensity of regulation". The construction of private residences is controlled by dozens or even hundreds of public regulations which restrict the freedom of individuals and firms of *how* the building activity is to be undertaken. The regulations prescribe for instance the noise and pollution emission, the composition of the work force (no children, a certain share of minorities etc.), the conditions of work (health and security standards etc.), the suppliers (a certain share of local firms etc.). The regulations on the construction of private residences also refer to how the *final product* has to look like, for instance concerning the type, shape, size, height, and colour of the building, the size of the surrounding garden etc. This intensity with which production and consumption are regulated varies greatly between economic sectors. While some of the regulations are designed to apply to all sectors of the economy, others apply to specific sectors, only. For simplicity, in the following two ranges of application of the regulations will be distinguished only: an official economy in which the regulations (and taxation) apply, and the unofficial economy in which there is no public regulation (nor taxation). The range of regulation depends on the reaction of the individuals which have the option to exit to unregulated areas, especially to the shadow economy (see e.g. Tanzi [1982], Simon and Witte [1982]). The government thus performs its maximization subject to the constraints

$$R \equiv \rho \cdot B \tag{2}$$

$$B = B(\rho, \rho_0), \quad B_\rho < 0 \tag{3}$$

where $\rho \geqq 0$ and ρ_0 is an exogenously given constant. ρ_0 indicates that intensity of regulation to which the individuals and firms have become used and to

which they have adjusted their pattern of economic activities. One may also speak of the customary or expected intensity of regulation. This contrasts with the actual intensity of regulation ρ. The range of regulation shrinks when regulatory activities increase because the individuals have a greater incentive to evade to the unregulated economy. This reaction will be stronger in the long run than in the short run because the individuals need time to adjust their customary pattern of economic activity to the new intensity of regulation. It is useful to split up the regulatory range into a permanent component B^p depending on ρ and a transitory component B^t depending on the relationships between the actual (ρ) and the customary (ρ_0) intensity of regulation:

$$B = B^p(\rho) + B^t(\rho, \rho_0) \; . \tag{4}$$

Taking account of (2) it follows that the "amount" of regulation R is

$$R = R^p(\rho) + R^t(\rho, \rho_0) \tag{5}$$

It is reasonable to assume relation (5) to have the following properties

$$R^p(0) = R^t(\rho, \rho) = 0$$

$$R^p_\rho(0) > 0, \quad R^t_\rho > 0$$

$$R^p_\rho(\tilde{\rho}) = 0, \quad \tilde{\rho} > 0$$

$$R^p_{\rho\rho} < 0, \quad R^t_{\rho\rho} < 0$$

The regulatory intensity $\tilde{\rho}$ is that intensity which maximizes the *permanent* part of regulation R. A necessary and sufficient condition for an internally optimal intensity of regulation in the short run $\rho = \rho^* > 0$, given ρ_0 (which normally differs from ρ^*) for the government to exist is

$$R^p_\rho(\rho^*) = -R^t_\rho(\rho^*, \rho_0) < 0 \; . \tag{6}$$

Our analysis shows

1) whatever the customary (expected) intensity of regulation (i.e. for every ρ_0), there exists a unique interior optimum for the intensity of regulation. The government thus has an incentive to *limit* the intensity of regulation because going beyond that limit reduces the range over which the regulations are followed so much that the amount of regulation R begins to fall,

2) as the optimal regulatory intensity ρ^* is *larger* than the regulatory intensity $\tilde{\rho}$ which maximizes the permanent part of regulation R^p [1], one may speak of *"overregulation"*.

So far, it has been assumed that the individuals (and firms) do not fully adjust to the intensity of regulation imposed by the government because they

[1] Clearly, this need not correspond to any "socially optimal" intensity of regulation.

stick in the short run to the established pattern of economic activity. In the *long run*, the customary intensity of regulation ρ_0 is adjusted in the light of the currently imposed intensity of regulation ρ. This adjustment creates costs: The individuals and firms have to search for new ways to get around the new (usually higher) intensity of regulation imposed by government. They have for instance to gather information on how they can take advantage of the opportunities provided by the unofficial economy, and they have to accordingly reorganize their pattern of consumption and production. It is reasonable to assume that the corresponding adjustment costs depend on the change in the customary intensity of regulation ρ_0, and more specifically that the adjustment costs are convex in $\dot{\rho}_0$. It is known that under these conditions the cost minimizing adjustment process can be approximated by a simple adaptive adjustment process (see e.g. SARGENT [1979], p. 127).

$$\dot{\rho}_0 \equiv \frac{d\rho_0}{dt} = \beta \cdot (\rho - \rho_0), \quad \beta = \text{const.} > 0 \ . \tag{7}$$

Assuming that the government sets its optimal intensity of regulation ρ^*, where

$$\rho^* = \Phi(\rho_0) = \rho \mid R^p_\rho(\rho) = -R^t_\rho(\rho, \rho_0), \quad \text{with } 1 > \Phi'(\rho_0) > 0 \ , \tag{8}$$

we have (with s indicating time)

$$\begin{cases} \lim\limits_{s \to \infty} \dot{\rho}_0 = 0 \\ \lim\limits_{s \to \infty} \rho^* \equiv \rho^{**} = \rho \mid R^p_\rho(\rho^*) = -R^t_\rho(\rho^*, \rho^*) < 0 \end{cases} \tag{9}$$

Given any initial expected intensity of regulation ρ_0, the regulatory intensity ρ^* which is optimal for the myopic government converges in every case to a *long run* regulatory intensity ρ^{**}. It is *larger* than the regulatory intensity $\tilde{\rho}$ which maximizes permanent regulation ($\rho^{**} > \tilde{\rho}$). There is "overregulation" also in the long run.

3. *A General Model of the Limits of Regulation and Taxation*

Government derives utility both from the amount of regulation R and tax revenue T. When it simultaneously uses two policy instruments, the intensity of regulation ρ and the tax rate τ, the maximization problem is

$$\max_{\rho,\tau} U(R, T), \quad U_i > 0, \quad U_{ij} \leqq 0; \quad i = R, T \tag{10}$$

$$\text{s.t.} \quad R \equiv \rho \cdot B \ , \tag{2}$$

$$T \equiv \tau \cdot B \ , \tag{11}$$

where B is for simplicity assumed to be both the range over which the government is able to regulate and to tax[2]. This range now depends both on the intensities of regulation and taxation

$$B = B(\rho, \rho_0, \tau, \tau_0) \tag{12}$$

with $\rho, \tau \geqq 0$. The customary (expected) intensities of regulation and taxation ρ_0, τ_0 are exogenously given for the maximizing government.

The range of regulation and taxation may again be split up into a permanent and transitory component

$$B = B^p(\rho, \tau) + B^t(\rho, \rho_0, \tau, \tau_0) \ . \tag{13}$$

Taking account of (2) and (11), the amount of regulation is

$$R = R^p(\rho, \tau) + R^t(\rho, \rho_0, \tau, \tau_0) \ , \tag{14}$$

and tax revenue is

$$T = T^p(\rho, \tau) + T^t(\rho, \rho_0, \tau, \tau_0) \ , \tag{15}$$

with properties analogous to those given for equation (5).

There exists an internal optimum for the government's maximization problem given by $(\rho, \tau) = (\rho^*, \tau^*) > 0$. The necessary and sufficient condition for this instrument use to be optimal is

$$R^p_i(\rho^*, \tau^*) + \alpha T^p_i(\rho^*, \tau^*) = -[R^t_i(\rho^*, \rho_0, \tau^*, \tau_0) + \alpha T^t_i(\rho^*, \rho_0, \tau^*, \tau_0)] < 0 \tag{16}$$

$$\text{with } \alpha \equiv U_T / U_R > 0, \ i = \rho, \tau \ .$$

The analysis shows

1) for every expected intensity of regulation and taxation (ρ_0, τ_0), there exists a unique internal optimum for (ρ, τ). Thus, there are (*endogenous*) *finite limits* for both the intensity of regulation and taxation. The government has an incentive not to extend regulatory intensity and the tax rate all too far because it makes the range for both activities shrink,

2) as $(\rho^*, \tau^*) > (\tilde{\rho}, \tilde{\tau})$ there is, in general, both *"overregulation"* and *"overtaxation"* compared to the intensity of regulation $\tilde{\rho}$ and the tax rate $\tilde{\tau}$ which maximizes permanent regulation and permanent tax revenues.

Individuals and firms adjust in the long run their vision of the customary intensity of regulation ρ_0 and taxation τ_0, taking account of the cost this reorganization of the pattern of consumption and production brings along. The result of our analysis being qualitatively unchanged, it is assumed that the (convex) adjustment costs caused by changes in ρ_0 and τ_0 are additively separable. The optimal adjustment process may again be approximated by

[2] For other purposes it may be useful to distinguish between the range of regulation base and the tax base.

$$\dot{\rho}_0 = \beta^\rho \cdot (\rho - \rho_0) \quad , \tag{7}$$

$$\dot{\tau}_0 = \beta^\tau \cdot (\tau - \tau_0) \quad , \tag{17}$$

with β^ρ, β^τ const. > 0.

Using the optimal values of the instruments, given ρ_0, τ_0 ,

$$\rho = \rho^* = \Phi^\rho(\rho_0, \tau_0) \tag{18}$$

$$\tau = \tau^* = \Phi^\tau(\rho_0, \tau_0) \tag{19}$$

it follows that

$$\begin{cases} \lim_{s \to \infty} \dot{\rho}_0 = \lim_{s \to \infty} \dot{\tau}_0 = 0 \\ \lim_{s \to \infty} (\rho^*, \tau^*) = (\rho^{**}, \tau^{**}) \end{cases} \tag{20}$$

with (ρ^{**}, τ^{**}) as the solution of

$$R_i^\rho(\rho^*, \tau^*) + \alpha T_i^\rho(\rho^*, \tau^*) = -[R_i^\tau(\rho^*, \rho^*, \tau^*, \tau^*) + \alpha T_i^\tau(\rho^*, \rho^*, \tau^*, \tau^*)] < 0 \quad , \tag{21}$$

$$i = \rho, \tau \quad .$$

For any initial expected intensity of regulation and taxation (ρ_0, τ_0), the optimal intensities (ρ^*, τ^*) converge in the long run to the optimal intensities of regulation and taxation $(\rho^{**}, \tau^{**}) > (\tilde{\rho}, \tilde{\tau})$. There is *"overregulation"* and *"overtaxation"* in both the short and long run.

4. Relationship of Partial and General Models

We can distinguish two partial models, one considering regulation only (R-model presented in section 2), the other considering taxation only (T-model) as has, for instance, been done by BUCHANAN and LEE [1982]. The general model constructed in section 3 contains the two partial models as special cases. The R-model partially optimizes the general model, keeping the tax rate $\tau = \bar{\tau}$ constant. The T-model keeps the rate of regulation $\rho = \bar{\rho}$ constant. The partial models are, except by chance, suboptimal (in addition to the general tendency for an excessive use of the two instruments) because the full steering capacity is not taken advantage of. Focusing on the *long run* results, be (ρ^{**}, τ^{**}) the government's optimal policy when the use of ρ and τ is simultaneously maximized (general model), and $\tau_T^{**}(\bar{\rho})$ the government's optimal tax policy with exogenously given (or unknown) regulatory intensity $\bar{\rho}$. It is possible to show

$$\tau_T^{**} \left\{ \gtreqless \right\} \tau^{**} > \tilde{\tau} \quad \text{for} \quad \bar{\rho} \left\{ \gtreqless \right\} \rho^{**} > \tilde{\rho} \quad . \tag{22}$$

When the exogenously given regulatory intensity $\bar{\rho}$ is larger than the fully optimal ρ^{**}, which in turn is larger than the regulation maximizing $\tilde{\rho}$, according to (22) it follows that $\tau_T^{**} < \tau^{**}$. It is then *possible* that moreover $\tau_T^{**} < \tilde{\tau}$. A combination of "overregulation" $(\rho^{**} > \tilde{\rho})$ with "undertaxation" $(\tau_T^{**} < \tilde{\tau})$ is thus viable. This result contradicts the result by BUCHANAN and LEE [1982] that the government *always* "overtaxes", i.e. sets a higher tax rate than that which maximizes permanent tax revenues.

5. Towards Testable Propositions

The extent of "overregulation" and "overtaxation" can be determined once the range function

$$B = B(\rho, \rho_0, \tau, \tau_0) \tag{12}$$

is empirically known. Due to the lack of data especially on regulation, and the insufficient attention that has been payed to distinguishing carefully between the intensity and range of regulation the range function has so far not been empirically established. There exists, however, some knowledge about the *partial* relationships connecting the tax intensity (tax rate) with the tax range (tax basis), and the regulatory intensity with the range of regulation. In the context of the Laffer-Curve, empirical tests have been undertaken to estimate the first mentioned relationship. Examples are e.g. FULLERTON [1982] or STUART [1961]. While it has been taken into account that the effect of tax rates τ on tax revenue T depends on many factors, the interdependence with the intensity of regulation has been neglected.

Little is known about the dependence of the regulatory range on the intensity of regulation. Preliminary attempts have been undertaken in the context of the quantitative measurement of the size of the shadow economy. Using the transactions approach (FEIGE [1979]) it has been found for the United States that the intensity of taxation and regulation is cet. par. positively related to the size of the shadow economy (HAVEMAN et al. [1983]). In a pooled cross-section/time series study of the relative size of the shadow economy in OECD countries using the "hidden variable" approach (FREY and WECK [1984]), it has been found that cet. par. both an increase in the intensity of regulation and taxation raises the size of the shadow economy in a statistically significant way. Both studies suggest[3] that the range of regulation and taxation (i.e. the size of the official economy) is negatively related to the burden imposed on individuals and firms by government.

On the basis of economic theory, testable hypotheses can be formulated about the *institutional conditions* which affect the range function and therefore make the deviations of the actual intensities of regulation and taxation as

[3] The results should, however, be interpreted with great care because of the unsatisfactory measurement of regulation.

set by a utility maximizing government from their long run maximizing values small or large. It can in general be expected that the negative effect of regulation and taxation on the size of the range B (the official economy) will be the stronger, the more easily it is possible to exit to the unofficial economy. In particular, overregulation and overtaxation will be the *smaller*

i) the smaller the units of government to which a particular type of regulation and taxation applies. Cet. par., in federalist countries and in small countries the intensity of regulation and taxation will be smaller than in unitary and large countries. To give an example: the regulations on gambling which Switzerland imposes are relatively weak because the Swiss can easily get the respective less regulated services just across the border in Lindau, Konstanz or Campione;

ii) the smaller the transaction costs involved in switching to a less regulated and less taxed sector. In areas of economic activity in which information on similar or identical less regulated activities is easily available or is even advertized (as in the case of gambling), and/or when the transportation costs of the switch to the unburdened sector are low, there will cet. par. be low regulation and taxation.

6. *Concluding Remarks*

Once the difference between the intensity of regulation and the range of regulation is perceived it is possible to derive *endogenous and finite* limits to regulation which a utility maximizing government does not surpass in its own interest. The intensity of regulation set by a government which is myopic due to the limited length of the election period lies both in the short and in the long run above the level which would come about in the case of time-less reaction because individuals and firms require time to adjust (*overregulation*). Accordingly, there is overtaxation if the effects of tax- and regulatory activities are independent of each other. In the case of interdependence, however, there will be both overregulation and overtaxation if the two instruments are simultaneously applied. If there is overregulation at the outset and if the government restricts itself to the (suboptimal) application of taxation (e.g. because it overlooks the interdependence between the instruments) there is not necessarily overtaxation any longer. Theoretical hypotheses are derived, but they can only be tested empirically once better data on regulations are available.

Summary

Regulation is an important part of government activity. Distinguishing between the intensity of regulation, and the range of regulation, it is possible to show that a short run utility maximizing government has an incentive to "overregulate" both in the short and long run, but that there are definite limits to regulatory intensity. Models of the limits of regulation and of the limits of taxation are special cases of a more general model in which government simultaneously uses the intensity of regulation and tax rates as instruments. In this case, it is possible that there is "overregulation" but no "overtaxation".

Zusammenfassung
Grenzen der Regulierung

Regulierung ist ein wichtiges Instrument der Wirtschaftspolitik. Es läßt sich zeigen, daß eine nur kurzfristig orientierte Regierung (kurzfristige Nutzenmaximierung) sowohl auf kurze wie auf lange Sicht "über"-reguliert, dabei allerdings eine bestimmte (endliche) Regulierungsintensität nicht überschreitet. Modelle, die Grenzen der Regulierung, und Modelle, die Grenzen der Besteuerung erklären, sind als Spezialfälle eines allgemeinen Ansatzes simultaner Festlegung von Regulierungs- und Steueraktivität zu verstehen. Nach einem solchen Ansatz kann "Über"-Regulierung *ohne* eine gleichzeitige "Über"-Besteuerung im Interesse der Regierung liegen.

References

ARANSON, P. H., and ORDESHOOK, P. C. [1981], "Alternative Theories of the Growth of Government and their Implications for Constitutional Law and Spending Limits", pp. 143–176, in: H. F. Ladd and T. N. Tideman (eds.), *Tax and Expenditure Limitations, Paper on Public Economics*, Washington.

BRENNAN, G., and BUCHANAN, J. M. [1980], *The Power to Tax: Analytical Foundations of a Fiscal Constitution*, Cambridge.

BUCHANAN, J. M., and LEE, D. R. [1982], "Politics, Time, and the Laffer Curve", *Journal of Political Economy*, 90, 816–819.

FEIGE, E. L. [1979], "How Big is the Irregular Economy?" *Challenge*, 22, 5–33.

FREY, B., and WECK, H. [1984], "The Hidden Economy as an 'Unobserved' Variable", *European Economic Review*, 26, 33–53.

FULLERTON, D. [1982], "On the Possibility of an Inverse Relationship between Tax Rates and Government Revenues", *Journal of Public Economics*, 19, 3–22.

HAVEMAN, R., POMMEREHNE, W. W., SCHNEIDER, F., and WOLF, B. [1983], *The Decline of Productivity Growth and the Rise of the Shadow Economy in the United States*, Discussion Paper, Department of Economics, University of Wisconsin.

PELTZMAN, S. [1976], "Towards a More General Theory of Regulation", *Journal of Law and Economics*, 19, 211–240.

PENOYER, R. J. [1981], *Directory of Federal Regulatory Agencies*, St. Louis.

POSNER, R. A. [1971], "Taxation by Regulation", *Bell Journal of Economics and Management Science*, 2, 22–50.

SARGENT, TH. J. [1979], *Macroeconomic Theory*, New York, San Francisco, London.

SIMON, C. P., and WITTE, A. D. [1982], *Beating the Systems: The Underground Economy*, Boston.

STIGLER, G. J. [1971], "The Theory of Economic Regulation", *Bell Journal of Economics and Management Science*, 2, 3–21.
STUART, C. E. [1981], "Swedish Tax Rates, Labor, Supply, and Tax Revenues", *Journal of Political Economy*, 89, 1020–1038.
TANZI, V. [1982], *The Underground Economy in the United States and Abroad*, Lexington.

Professor Dr. Bruno S. Frey
Universität Zürich
Institut für Empirische Wirtschaftsforschung
CH-8008 Zürich
Schweiz

Professor Dr. Hans Jürgen Ramser
Universität Konstanz
Fakultät für Wirtschaftswissenschaften und Statistik
D-7750 Konstanz 1
Bundesrepublik Deutschland

Vol. 142, No. 3 JITE September 1986

Articles / *Abhandlungen*

Short Articles / *Kurzbeiträge*

Discussion / *Diskussion*

Book Reviews / *Besprechungen*