

**BALANCED BUDGET MULTIPLIER,  
IMPERFECT COMPETITION AND INDIRECT TAXATION\***

**Ramón J. Torregrosa\*\***

WP-EC 99-02

---

\* I am grateful to G. Fernández de Cordoba, A. Castañeda and an anonymous referee for their helpful comments. The usual caveat applies.

\*\* R. Torregrosa: Universidad de Salamanca.

Editor: **Instituto Valenciano de  
Investigaciones Económicas, S.A.**  
Primera Edición Febrero 1999.  
ISBN: 84-482-2024-2  
Depósito Legal: V-774-1999  
Impreso por Copistería Sanchis, S.L.,  
Quart, 121-bajo, 46008-Valencia.  
Impreso en España.

# BALANCED BUDGET MULTIPLIER, IMPERFECT COMPETITION AND INDIRECT TAXATION

Ramón J. Torregrosa

## ABSTRACT

This paper presents a counter-example to some new-Keynesian features. In particular, by considering indirect tax rates, I obtain a negative and monotonically non-increasing relation between the magnitude of both the balanced budget and the welfare multipliers with respect to the market-power.

Keywords: Balanced Budget Multiplier, Imperfect Competition, Indirect Taxation  
JEL: E12, E62, L16.

## RESUMEN

Este artículo presenta un contraejemplo a algunas propiedades neo-keynesianas de los modelos de equilibrio general con competencia imperfecta. En particular, para el caso de impuestos indirectos, se obtiene una relación negativa y monótona no-creciente para los multiplicadores con presupuesto equilibrado y del bienestar respecto del poder del mercado.

Palabras clave: Multiplicador con Presupuesto Equilibrado, Competencia Imperfecta, Impuesto Indirecto



## 1. Introduction

General equilibrium models with imperfect competition have been used as an explanation of some Keynesian features with fully flexible prices. In this way, papers like Hart (1982), Blanchard and Kiyotaki (1987), Dixon (1987) and Mankiw (1988), among others, explore the effect of different market-power settings on the macroeconomic multipliers, reaching a positive and monotonically increasing relationship between the balanced budget multiplier and market-power. A common setup of these models is such that the government can resort to lump-sum taxation to balance its budget. In this framework imperfect competition works as the only inefficiency source which generates a space for public intervention. This insight is supported on the basis that fiscal policy does not distort relative prices, though it could be not possible in practice. This statement questions whether these Keynesian features of the multiplier remain unchanged under distortionary tax schemes, or not. Within this trend, Molana and Moutos (1992) and Heijdra, et. al., (1998) find non-positive multipliers for labor income tax rates, whereas Torregrosa (1997) demonstrates that this multiplier can be monotonically decreasing, and even non-monotonically, with respect to market-power.

Considering this point of departure, this paper deals with the relationship between the balanced budget multiplier and market-power, for indirect (ad-valorem and excise) tax rates schemes, reaching another counter-example to the Dixon-Mankiw monotonicity result.

The paper is structured as follows: In section 2, the model is presented and both output and welfare multipliers are calculated in its general form. Sections 3 and 4 are devoted to develop these multipliers for both the ad-valorem and excise tax rates schemes respectively. Finally, section 5 concludes with the final comments.

## 2. The economy

Let us consider an economy formed by two commodities: leisure considered as the numéraire and a composed commodity produced from labor;  $n + 2$  independent agents: the social representative consumer, the government and  $n$  non-competitive firms. The former two agents constitute the demand-side of the economy and the latter the supply-side, according to the following assumptions:

(i) Household preferences are represented by a separable utility function. On the one hand, a Cobb-Douglas sub-utility function over consumption of the produced good (C) and leisure (L) and, on the other, a sub-utility function over the public provided produced good (g)

$$u(C,L,g) = C^\alpha L^{1-\alpha} + \beta(g), \quad (1)$$

where  $\alpha \in (0,1)$ ;  $\beta(0) = 0$ ,  $\beta' > 0$  and  $\beta'' \leq 0$ . Calling T the endowment of time, p the price of the produced commodity, and  $\Pi$  the total profits of the firms. The household budget constraint is given by

$$pC = T - L + \Pi. \quad (2)$$

Consumer's choice is related only to C and L. Then, the solution for the maximization of (1) subject to (2) is

$$C = \alpha(T + \Pi)/p, \quad (3)$$

$$L = (1-\alpha)(T + \Pi). \quad (4)$$

(ii) Government's role is modeled in the usual Keynesian fashion: a indirect tax revenue (R) is used to resort the amount g of government purchases. Thus, given the price p, the government budget's constraint is

$$R = pg \equiv G. \quad (5)$$

Adding equations (3) and (5), the total expenditure in the economy is given by

$$Y = \alpha (T + \Pi) + G, \quad (6)$$

which represents demand-side economics.

(iii) The industry is formed by  $n$  non-competitive firms producing an amount  $q_j$  ( $j = 1, 2, \dots, n$ ) of output from labor. Without loss of generality, let us assume the simple constant returns technology  $q_j = N_j$  ( $N = \sum_{j=1}^n N_j$ ). It is also assumed that labor market is competitive and firms' choices are independent, despite households are firm's owners. Then, the goal of the representative firm is to maximize,

$$pq_j - q_j - R_j, \quad (7)$$

where  $R_j$  represents the amount of taxes levied on the  $j$ th firm and

$$R = \sum_{j=1}^n R_j, \quad (8)$$

refers to the total tax revenue. Section 3 is devoted to the ad valorem tax rate case, where  $R_j = t_1 p(Q)q_j$  with  $0 \leq t_1 < 1$ , while section 4 is concerned with the excise tax rate case  $R_j = t_2 q_j$ , with  $t_2 \geq 0$ .

The first order condition for equation (7) can be written as,

$$p(1 - \mu) = 1 + [dR_j/dq_j], \quad (9)$$

where  $\mu \in [0,1]$  is interpreted as a measure of market-power: when  $\mu$  tends to one firms behave as monopolist (perfect collusion); when  $\mu$  tends to zero firms behave as Bertrand oligopolists (perfect competition); when  $\mu = \varepsilon/n$ , where  $\varepsilon$  is elasticity of demand, firms behave *a la Cournot*. Finally, given the better firm's choice  $\bar{q}_j$  where fulfills equation (9), supply-side economics is represented by total output

$$Q = \sum_{j=1}^n \bar{q}_j, \quad (10)$$

and aggregate profits in the economy

$$\Pi = \sum_{j=1}^n \Pi_j. \quad (11)$$

Where  $\Pi_j = p(Q)\bar{q}_j - \bar{q}_j - R_j$  is the representative firm's profit in equilibrium.

Finally, general equilibrium requires the usual market clearing condition

$$Y = pQ, \quad (12)$$

which implies, according to equation (6), that

$$Q = g + \alpha (T + \Pi)/p. \quad (13)$$

Both  $\Pi$  and  $p$  depend on  $g$  due to equations (5), (7) and (8). Then, differentiating equation (13) with respect to  $g$ , taking into account equation (3), the output balanced budget multiplier is

$$\frac{dQ}{dg} = 1 + \frac{\alpha}{p} \frac{d\Pi}{dg} - \frac{C}{p} \frac{dp}{dg}. \quad (14)$$



The increase in output due to an raise in government purchases is affected, first, by an income effect through the change in profits and, second, by a price effect that results from an increase in the tax rate needed to finance the higher government purchases.

Finally, it is interesting to study the effect on welfare of such a boost policy. Substituting equations (3) and (4) in equation (1), indirect utility function is obtained as,

$$V(p, \Pi, g) = \gamma(T + \Pi)p^{-\alpha} + \beta(g),$$

where  $\gamma = \alpha^\alpha(1-\alpha)^{1-\alpha}$ . Differentiating with respect to  $g$  and taking into account equation (3)

$$\frac{dV}{dg} = \gamma p^{-\alpha} \left[ \frac{d\Pi}{dg} - C \frac{dp}{dg} \right] + \beta', \quad (15)$$

represents the impact of the balanced budget boost policy on welfare. As it can be observed, the positive effect on welfare due to a larger government purchases is diminished by the change in consumption. This change is motivated by price increase and the profits' decrease, being both generated by the change in tax rate binding the government budget's constraint. It is necessary to remark that this effect on welfare is opposed to the Keynesian features. This is because, according to Keynes, the balanced budget boost policy should not cause changes in welfare.

Next sections are devoted to compute these effects for both ad-valorem and excise tax rates.

### 3. Balanced budget boost policy under ad-valorem tax rates

In this case  $R_j = tp(Q)q_j$  with  $t \in [0,1)$ . Thus, according to equation (9), the equilibrium price is

$$p = 1/(1-t)(1-\mu), \quad (16)$$

due to equations (5) and (8), equilibrium government purchases are

$$g = tQ \quad (17)$$

and aggregate profits in equilibrium are

$$\Pi = \mu Q/(1-\mu). \quad (18)$$

In order to compute the balanced budget multiplier defined in equation (14), the variations on profits and price of the balanced budget boost policy must be calculated. First, from equation (18),

$$\frac{d\Pi}{dg} = \frac{\mu}{(1-\mu)} \frac{dQ}{dg}. \quad (19)$$

Secondly, for variation on price, let us start computing the variation on the tax rate consistent with the government's budget constraint given by equation (18), which is

$$\frac{dt}{dg} = \frac{1}{Q} \left[ 1 - t \frac{dQ}{dg} \right]. \quad (20)$$

Thus differentiating equation (16) with respect to  $g$ , and taking into account equation (20),

$$\frac{dp}{dg} = \frac{p}{(1-t)} \frac{1}{Q} \left[ 1 - t \frac{dQ}{dg} \right]. \quad (21)$$

Substituting equations (19) and (21) in equation (14) and operating, the output balanced budget multiplier equals zero, i. e.,  $\frac{dQ}{dg} = 0$ . This means that a balanced budget boost policy has no effects on output (employment). The explanation of this total crowding out effect, under ad-valorem tax rates, is that the boost policy increases both government's demand and price, in such amount that the decrease in consumption equals the increase in government's demand. Hence, firms do not change neither its output level nor its profits (substituting the result about the multiplier in equation (19)  $\frac{d\Pi}{dg} = 0$ ). The effect on price is calculated differentiating equation (21) with respect to  $g$ , which is  $\frac{dp}{dg} = \frac{p}{(1-t)} \frac{1}{Q} > 0$ . This allows us to compute the effects of the balanced budget boost policy on the welfare. Then, substituting the multipliers in equation (15) taking into account equations (13) and (17) and operating, the following equality holds,

$$\frac{dV}{dg} = \beta' - \gamma p^{1-\alpha}. \quad (23)$$

As it can be seen, a balanced budget boost policy under ad-valorem tax rate affects welfare in two ways: a positive effect derived from the increase on the government purchases and a negative effect arising from the increase in price due to the increase in the tax rate. Finally, the way the effect of the balanced budget boost policy on the welfare changes with respect to the market-power can be computed differentiating equation (23) with respect to  $\mu$

$$\frac{d}{d\mu} \left[ \frac{dV}{dg} \right] = - (1-\alpha) \gamma p^{-\alpha} \frac{dp}{d\mu}.$$

Since, according to equation (16),  $dp/d\mu = p/(1-\mu) > 0$ , the effect of the balanced budget boost policy on the welfare is monotonically decreasing with respect to the market-power.

#### 4. Balanced budget boost policy under excise taxes

In this case  $R_j = t q_j$  with  $t \in [0,1]$ .<sup>1</sup> Thus, according to equation (9) the equilibrium price is

$$p = (1+t)/(1-\mu). \quad (24)$$

According to equations (5) and (8), equilibrium government purchases are

$$g = tQ/p \quad (25)$$

and aggregate profits in equilibrium are

$$\Pi = p\mu Q. \quad (26)$$

In order to compute the balanced budget multiplier defined in equation (14), the variations on profits and price of the balanced budget boost policy must be calculated. First, differentiating equation (26) with respect to  $g$ ,

$$\frac{d\Pi}{dg} = \mu \left[ Q \frac{dp}{dg} + p \frac{dQ}{dg} \right]. \quad (27)$$

Secondly, for variation on price, let us start computing the variation on the tax rate consistent with equation (25), that is

$$\frac{dt}{dg} = \frac{1}{Q} \left[ g \frac{dp}{dg} + p - t \frac{dQ}{dg} \right]. \quad (28)$$

---

<sup>1</sup>Despite that  $t$  can be higher than one, it is assumed that  $t \leq 1$ . This condition is also compatible with the fact that household expenditure is higher than public expenditure. In fact, the ratio between public expenditure and total expenditure is given by, according to equations (12) and (17),  $G/Y = t/p$  and the ratio between household expenditure and total expenditure is given by, according with equations (2) and (6),  $pC/Y = 1 - t/p$ . If  $\forall \mu \in [0,1]$   $pC > G$  then,  $1-t/p > t/p$ . Using equation (24), it is hold that when  $\mu > (t-1)/2t$ , but since  $\mu \geq 0$  then,  $t \leq 1$ .

Thus, differentiating equation (24) with respect to  $g$ , taking into account (28),

$$\frac{dp}{dg} = \frac{p}{Q} \left[ 1 - t \frac{dQ}{dg} \right]. \quad (29)$$

Substituting equations (27) and (29) in equation (14) and operating, the output balanced budget multiplier under excise tax rates can be written as

$$\frac{dQ}{dg} = \frac{-(1-\alpha)\mu(1+t)^2}{(1-\mu)(1-\alpha\mu-(1-\alpha)\mu t^2)} < 0, \quad (30)$$

since  $t \leq 1$ .<sup>2</sup> It is interesting to know how the multiplier behaves with respect to market-power. For this purpose, let us call  $M(\mu) = dQ/dg$ . Hence, differentiating equation (30) with respect to  $\mu$  and simplifying

$$\frac{dM}{d\mu} = -\frac{M(\mu)}{\mu} \left[ 1 + \frac{\mu(\alpha + (1-\alpha)t^2)}{(1-\alpha\mu-(1-\alpha)\mu t^2)} + \frac{\mu}{1-\mu} \right] < 0,$$

i.e., for  $t \in [0,1]$ , the balanced budget multiplier,  $M(\mu)$ , is negative and monotonically decreasing with respect to market-power.

Finally, substituting equations (27) and (29) in equation (15) and simplifying, the effect of the balanced budget boost policy on welfare is given by

$$\frac{dV}{dg} = \beta' - \gamma p^{1-\alpha} \left[ 1 - \frac{(\mu+t)}{(1+t)} M(\mu) \right], \quad (31)$$

---

<sup>2</sup>In the case that  $t > 1$ ,  $dQ/dg$  loses its monotonicity finding a vertical asymptote in  $\mu^* = 1/(\alpha+(1-\alpha)t^2)$ . But this case could be a misinterpretation of real economies. This is because  $t$  is expressed in units of leisure. Hence,  $t > 1$  means an excise tax higher than the current wage. In the model this situation belongs to a benchmark where public expenditure is higher than household expenditure.

arising again two opposite effects. The first one is due to the more availability of public-providing amount  $g$  of the produced commodity. The second one is negative due to the increase in the tax rate necessary to resort additional government purchases, which is shifted to households through higher price and lower profits. Finally, differentiating equation (31) with respect to  $\mu$  we have

$$\frac{d}{d\mu} \left[ \frac{dV}{dg} \right] = - \gamma(1-\alpha)p^{-\alpha} \frac{dp}{d\mu} \left[ 1 - \frac{(\mu+t)}{(1+t)} M(\mu) \right] + \gamma(1-\alpha)p^{1-\alpha} \left[ \frac{M(\mu)}{(1+t)} + \frac{(\mu+t)}{(1+t)} M(\mu)' \right]$$

which is negative because  $M(\mu) < 0$  and  $M(\mu)' < 0$ . Then, the effect of the balanced budget boost policy on welfare is monotonically decreasing with market-power.

## 5. Conclusions

In this paper, both the monotonicity of the output (employment) multiplier and the effects on welfare of a balanced budget boost policy have been analyzed under the two main indirect tax rates. The results confirm the lack of regularity of the balanced budget multiplier in market clearing models with imperfect competition. For instance, under the ad-valorem tax rate scheme, output (employment) multiplier equals zero, which means that changes in public purchases have no effect on output, reaching a total crowding out effect for every level of market-power, conclusion which is similar to the reached by Molana and Moutos (1992) and Heijdra, et. al., (1998) for a distortionary income taxation. The explanation of this total crowding out effect in the model is that government boost policy increases the price through taxes. This increase yields a consumption falls in the same proportion the government increases its purchases. With respect to the effect on welfare of a boost policy this kind, it has been demonstrated that this effect is

negative and monotonically decreasing with respect to market power, pointing out a counter-Keynesian feature in welfare.

In the case of the excise tax rate, the results are related to market-power just in the opposite way to the conclusion reached by Dixon (1987) and Mankiw (1988). The output balanced budget multiplier is monotonically decreasing with respect to market-power, conclusion which is similar to the one reached by Torregrosa (1998) for a distortionary income taxation. With respect to welfare, like in the former case, the effect of a government boost policy is monotonically decreasing with respect to market-power.

In conclusion, Keynesian features attributed to the general equilibrium models with fully flexible prices and imperfect competition depend almost on the tax scheme considered. It is true that market-power causes inefficiency but it is also true that taxes, in general, do it too. In this sense, government is using an inefficient tool in order to amend an inefficiency. Thus, the consequence of an increase of public purchases do not drive the economy to a higher levels of output and welfare. On the contrary, as it has been proved, these magnitudes are dampened by such a boost policy and this effect is higher as higher is the market-power degree.

## References

- Blanchard, O. and Kiyotaki, N. (1987): "Monopolistic competition and the effects of aggregated demand". *American Economic Review*, 77, 647-66.
- Dixon, H. (1987): " A simple model of imperfect competition with Walrasian features", *Oxford Economic Papers*, 39, 134-160.
- Hart, O. (1982): "A model of imperfect competition with Keynesian features", *The Quarterly Journal of Economics*, 97, 109-138.
- Heijdra, B. J. Ligthart, J. E. and van der Ploeg, F. (1998): "Fiscal policy, distortionary taxation, and direct crowding out under monopolistic competition", *Oxford Economic Papers*, 50, 79-88.
- Mankiw, N. G. (1988): "Imperfect competition and the Keynesian cross", *Economics Letters* 26, 7-13.
- Molana, H. and Moutos, T. (1992): "A note on taxation, imperfect competition and the balance budget multiplier", *Oxford Economic Papers*, 44, 68-74.
- Torregrosa, R. (1997): "Competencia imperfecta, multiplicador con presupuesto equilibrado e imposición distorsionante", *Revista Española de Economía*, 14, 67-83.
- Torregrosa, R. (1998): "On the monotonicity of balanced budget multiplier under imperfect competition", *Economics Letters* 59, 331-335.



## DOCUMENTOS PUBLICADOS\*

- WP-EC 96-01 "Determinantes de la Estructura Temporal de los Tipos de Interés de la Deuda Pública"  
P. Rico. Febrero 1996.
- WP-EC 96-02 "Una Estimación Econométrica del Stock de Capital de la Economía Española"  
A. Denia, A. Gallego, I. Mauleón. Febrero 1996.
- WP-EC 96-03 "La Propiedad de Simetría en los Rendimientos Financieros Diarios Españoles"  
A. Peiró. Febrero 1996.
- WP-EC 96-04 "A Note about Effort, Wages, and Unemployment"  
M. D. Alepuz, M. A. Diaz, R. Sánchez. Abril 1996.
- WP-EC 96-05 "Efectos Macroeconómicos de una Sustitución de un Impuesto Específico por IVA Bajo Competencia Imperfecta. Una Aproximación."  
R. Torregrosa. Abril 1996.
- WP-EC 96-06 "Technical Progress in Spanish Banking: 1985-1994"  
J. Maudos, J.M. Pastor, J. Quesada. Abril 1996.
- WP-EC 96-07 "Long-Run Groundwater Reserves Under Uncertainty"  
S. Rubio, J. Castro. Abril 1996.
- WP-EC 96-08 "Dimensión Regional de la Innovación Tecnológica"  
M. Gumbau. Abril 1996.
- WP-EC 96-09 "Growth and Population Aging: The Spanish Case"  
J. García Montalvo, J. Quesada. Julio 1996.
- WP-EC 96-10 "Eficiencia Productiva Sectorial en las Regiones Españolas: Una Aproximación Frontera"  
M. Gumbau, J. Maudos. Septiembre 1996.
- WP-EC 96-11 "Desajuste Educativo y Formación Laboral Especializada: Efectos Sobre los Rendimientos Salariales"  
P. Beneito, J. Ferri, M.L. Moltó, E. Uriel. Septiembre 1996.
- WP-EC 96-12 "Market Structure and Performance in Spanish Banking Using a Direct Measure of Efficiency"  
J. Maudos. Septiembre 1996.
- WP-EC 96-13 "Estudio de las Relaciones Entre el Contrato de Futuro sobre IBEX-35 y su Activo Subyacente"  
F. J. Climent, A. Pardo. Octubre 1996.
- WP-EC 96-14 "Job Search: Intensity and Reservation Wage in the Spanish Labour Market"  
J. M. Blanco, A. Picazo. Octubre 1996.
- WP-EC 96-15 "Target Setting: An Application to the Branch Network of Caja de Ahorros del Mediterraneo"  
C.A. Knox Lovell, J. T. Pastor. Octubre 1996.
- WP-EC 96-16 "Financing a Nationalized Monopoly: Coase's Versus Hotelling-Lerner's Solution"  
R. Torregrosa. Diciembre 1996.

---

\*Para obtener una lista de documentos de trabajo anteriores a 1996, por favor, póngase en contacto con el departamento de publicaciones del IVIE.

- WP-EC 96-17 "Atracción de Centros Comerciales en el Contexto de la Elección Discreta Individual"  
F. Más. Diciembre 1996.
- WP-EC 96-18 "Valoración Crediticia de la Deuda de las Comunidades Autónomas Españolas: Una Aplicación del Análisis Discriminante"  
J. Auriolles, A. Pajuelo, R. Velasco. Diciembre 1996.
- WP-EC 96-19 "Financiación de las PYMES en la Comunidad Valenciana: Estudio Empírico"  
J. López, V. Riaño, M. Romero. Diciembre 1996.
- WP-EC 96-20 "Un modelo intertemporal de determinación de la balanza por cuenta corriente de la economía española"  
M. Camarero, V. Esteve, C. Tamarit. Diciembre 1996.
- WP-EC 96-21 "Política de precios y reajustes en los márgenes de beneficio. El comportamiento de los exportadores españoles de automóviles"  
J. Balaguer, V. Orts, E. Uriel. Diciembre 1996.
- WP-EC 97-01 "A recent exploratory insight on the profile of the Innovative entrepreneur: conclusions from a Cross-tabs analysis"  
I. March, R.M. Yagüe. April 1997.
- WP-EC 97-02 "Optimal Growth and the Intertemporal Allocation of Recreation and Productive Land "  
R. Goetz, S. Rubio. Abril 1997.
- WP-EC 97-03 "Ineficiencias en las Negociaciones entre Dos Agentes Completamente Informados"  
V. Calabuig. Abril 1997.
- WP-EC 97-04 "Un Enfoque de Cartera para la Diversificación Regional"  
E. Reig, A. Picazo. Junio 1997.
- WP-EC 97-05 "Shocks Agregados Vs. Shocks Sectoriales: Un Análisis Factorial"  
F. Goerlich. Junio 1997.
- WP-EC 97-06 "Dynamic Factor Analytic Model Estimation Using DYNFAC - A Guide for Users-"  
F. Goerlich. Junio 1997.
- WP-EC 97-07 "Gasto Público y Consumo Privado en España ¿Sustitutivos o Complementarios?"  
M. Camarero, V. Esteve, C. Tamarit. Julio 1997.
- WP-EC 97-08 "Are Business Cycles Asymmetric? Some European Evidence"  
A. Peiró. Julio 1997.
- WP-EC 97-09 "Análisis no paramétrico de eficiencia en presencia de outputs no deseables"  
A. Picazo, E. Reig, Hernández. Julio 1997.
- WP-EC 97-10 "Continuities and Discontinuities in the Economic Growth of Spain. 1850-1936"  
A. Cubel, J. Palafox. Octubre 1997.
- WP-EC 97-11 "Monetary Policy Transmission in the EMS: A VAR Approach"  
J. García-Montalvo, E. Shioji. Octubre 1997.
- WP-EC 97-12 "Efficiency of European Banking Systems: A Correction by Enviornmental Variables"  
J. Pastor, A. Lozano, J.M. Pastor. Octubre 1997.
- WP-EC 97-13 "Seasonal Unit Roots in Trade Variables"  
C. Alexander, M. Cantavella. Octubre 1997.

- WP-EC 97-14 "El tamaño como determinante de la estrategia de las empresas españolas"  
J.M. Pastor, M. Illueca. Octubre 1997.
- WP-EC 97-15 "Competencia Imperfecta, Multiplicador con Presupuesto Equilibrado e Imposición Distorsionante"  
R. Torregrosa. Diciembre 1997.
- WP-EC 97-16 "Strategic Investments and Multinational Firms under Oligopoly"  
R. Moner, V. Orts, J.J. Sempere. Diciembre 1997.
- WP-EC 97-17 "The Capital Stock of the Spanish Economy 1900-1958"  
A. Cubel, J. Palafox. Diciembre 1997.
- WP-EC 97-18 "Strategic Behavior and Efficiency in a Groundwater Pumping Differential Game"  
S. Rubio, B. Casino. Diciembre 1997.
- WP-EC 97-19 "La Demanda de Vivienda en España"  
M.C. Colom, M.C. Cruz. Diciembre 1997.
- WP-EC 97-20 "Convergencia en las Regiones Españolas: Cambio Técnico, Eficiencia y Productividad"  
J. Maudos, J.M. Pastor, L. Serrano. Diciembre 1997.
- WP-EC 98-01 "Incidencia de los tipos del mercado monetario sobre los precios de las operaciones bancarias"  
M.T. Barreira, R. Ferrer, C. González. Febrero 1998.
- WP-EC 98-02 "Product Mix of the Spanish Banking Firms: Do Competition Clubs Exist?"  
F. Pérez, E. Tortosa. Febrero 1998.
- WP-EC 98-03 "Las Operaciones fuera de Balance en el Sistema Bancario Español"  
J. Fernández. Febrero 1998.
- WP-EC 98-04 "Capital Humano, Estructura Sectorial y Crecimiento en las Regiones Españolas"  
L. Serrano. Marzo 1998.
- WP-EC 98-05 "Crecimiento Óptimo, Depreciación Endógena y Subutilización del Capital"  
O. Licandro, L.A. Puch, J.R. Ruiz. Marzo 1998.
- WP-EC 98-06 "Capital Humano y Movilidad Espacial del Trabajo en la Economía Española"  
L. Serrano. Marzo 1998.
- WP-EC 98-07 "La Estructura Temporal de los Tipos de Interés en España. El Modelo Cox, Ingersoll y Ross"  
P. Rico Belda. Abril 1998.
- WP-EC 98-08 "Análisis de las Primas por Plazo en el Mercado Español de Deuda Pública"  
P. Rico Belda. Abril 1998.
- WP-EC 98-09 "Desigualdad y Convergencia en la Área de OCDE"  
M. Mas, F. Goerlich. Abril 1998.
- WP-EC 98-10 "Efficiency and Risk Management in Banking Firms: A Method to Decompose Risk"  
J.M. Pastor. Mayo 1998.
- WP-EC 98-11 "La Compra Impulsiva y la Compra Patológica: El Modelo CAC #"  
I. Quintanilla, R. Luna, G. Berenguer. Mayo 1998.
- WP-EC 98-12 "Capital Humano y Convergencia Regional"  
L. Serrano. Mayo 1998.

- WP-EC 98-13 “Classifying High-Tech New Ventures by Performance: the Market-Technological-Entrepreneurial Matrix” I. March, R.M. Yagüe. Junio 1998.
- WP-EC 98-14 “Rendimientos Bursátiles y Eficiencia Productiva: el Caso de la Banca Española” M. Illueca, J. Maudos. Junio 1998.
- WP-EC 98-15 “Cambio de Régimen y Sostenibilidad a Largo Plazo de la Política Fiscal: el Caso de España” M. Camarero, V. Esteve, C. Tamarit. Junio 1998.
- WP-EC 98-16 “Liquidez y *Market Makers* en el Mercado de Futuros: Un Análisis con Datos de muy Alta Frecuencia” J. García Montalvo. Junio 1998.
- WP-EC 98-17 “Influence of Labour Market Signals and Family Background on the University Education Demand” C. Albert. Junio 1998.
- WP-EC 98-18 “Relación Bilateral entre Industria Oferente y Demandante Mediante Grupos Estratégicos” F. Más. Junio 1998.
- WP-EC 98-19 “Human Capital in OECD Countries: Technical Change, Efficiency and Productivity” J. Maudos, J.M. Pastor, L. Serrano. Septiembre 1998.
- WP-EC 98-20 “Japan/USA: The (Apparent) Miracle of Convergence” F. Goerlich and M. Mas. Septiembre 1998.
- WP-EC 98-21 “Convergence in OECD Countries: Technical Change, Efficiency and Productivity” J. Maudos, J.M. Pastor, L. Serrano. Septiembre 1998.
- WP-EC 98-22 “Crecimiento y Estados Estacionarios Regionales: Estabilidad y Factores Determinantes” L. Serrano. Septiembre 1998.
- WP-EC 98-23 “Strategic Pigouvian Taxation, Stock Externalities and Polluting Non-Renewable Resources” S. Rubio, L. Escriche. Septiembre 1998.
- WP-EC 98-24 “Las Transiciones de los Jóvenes de la Escuela al Mercado de Trabajo: Un Análisis de Flujos” C. Albert, J. Juárez, R. Sánchez, L. Toharía. Septiembre 1998.
- WP-EC 98-25 “Least Square Estimates Symmetrically Adjusted with no loss of Information in the Truncated Tobit Model” E. Uriel, M<sup>a</sup>C. Colom, M<sup>a</sup>C. Molés y M<sup>a</sup>L. Moltó. Octubre 1998.
- WP-EC 98-26 “Efficiency and Productive Specialization: An Application to the Spanish Regions” J. Maudos, J.M. Pastor, L. Serrano. Octubre 1998.
- WP-EC 98-27 “Firm-Specific Temporal Variation in Technical Efficiency: Results of a Stochastic Output Distance Function” R. Álvarez, L. Orea. Diciembre 1998.
- WP-EC 98-28 “Estructura Temporal de los Tipos de Interés y Crecimiento Económico en España” P. Rico. Diciembre 1998.
- WP-EC 99-01 “Rentabilidad y Liquidez Alrededor de los Splits” J. C. Gómez. Febrero 1999.
- WP-EC 99-02 “Balanced Budget Multiplier, Imperfect Competition and Indirect Taxation” R. Torregrosa. Febrero 1999.
- WP-EC 99-03 “Análisis Económico de la Elección de Carrera Universitaria. Un Modelo *Logit* Binomial de Demanda Privada de Educación”, J. Jiménez, M. Salas. Febrero 1999.