Tilburg University

Financial integration and fiscal policy in interdependent two-sector economies with real and nominal wage rigidity

de Groof, R.J.; van Tuijl, M.A.

Publication date:
1994

[Link to publication in Tilburg University Research Portal](#)

Citation for published version (APA):

de Groof, R. J., & van Tuijl, M. A. (1994). *Financial integration and fiscal policy in interdependent two-sector economies with real and nominal wage rigidity*. (Reprint series / CentER for Economic Research; Vol. 149). Unknown Publisher.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

R
CBM
R
4-149
8823
1994
NR.149

entER
for
Economic Research

REPRINT

Financial Integration and Fiscal
Policy in Interdependent
Two-sector Economies with Real
and Nominal Wage Rigidity

by
Rob de Groof and
Martin van Tuijl

Reprinted from European Journal of Political
Economy, Vol. 9, 1993, North-Holland

Reprint Series
no. 149

CENTER FOR ECONOMIC RESEARCH

Board

Harry Barkema
Helmut Bester
Eric van Damme, Chairman
Frank van der Duyn Schouten
Jeffrey James

Management

Jeffrey James (Director of Graduate Studies)
Arie Kapteyn (Scientific Director)
Marie-Louise Kemperman (Managing Director)

Scientific Council

Anton Barten	Université Catholique de Louvain
Eduard Bomhoff	Erasmus University Rotterdam
Willem Buiter	Yale University
Jacques Drèze	Université Catholique de Louvain
Jack Kleijnen	Tilburg University
Theo van de Klundert	Tilburg University
Jean-Jacques Laffont	Université des Sciences Sociales de Toulouse
Merton Miller	University of Chicago
Piet Moerland	Tilburg University
Philippe Naert	Nijenrode University
Pieter Ruys	Tilburg University

Residential Fellows

Hans Bloemen	CentER
Lans Bovenberg	CentER, Erasmus University Rotterdam
Hans Carlsson	Göteborg University and Lund University
Jay Pil Choi	Columbia University
Jan Magnus	CentER, LSE
Andrew Mountford	CentER
Bezalel Peleg	Hebrew University of Jerusalem
Mark Steel	CentER/Department of Econometrics, Tilburg University
Frank Verboven	CentER
Oscar Volij	Hebrew University of Jerusalem
Karl-Erik Wärneryd	Stockholm School of Economics

Address : P.O. Box 90153, 5000 LE Tilburg, The Netherlands
Phone : +31 13 663102
Telex : 52426 kub nl
Telefax : +31 13 663066
E-mail : center@kub.nl

ISSN 0924-7874

**Financial Integration and Fiscal
Policy in Interdependent
Two-sector Economies with Real
and Nominal Wage Rigidity**

by
**Rob de Groof and
Martin van Tuijl**

Reprinted from European Journal of Political
Economy, Vol. 9, 1993, North-Holland

**Reprint Series
no. 149**

Financial integration and fiscal policy in interdependent two-sector economies with real and nominal wage rigidity

Rob de Groof and Martin van Tuijl*

Tilburg University, Tilburg, Netherlands

Accepted for publication June 1992

A two-country–two-sector model with a portfolio choice between money and imperfectly substitutable domestic and foreign bonds, floating exchange rates and perfect foresight is presented. Account is taken of capital accumulation, government debt and current account dynamics. Numerical methods, including extensive sensitivity analysis, are used to trace the consequences of financial integration for the effects and spill-over effects of fiscal policy. Another purpose is to establish the relevance of disaggregation for the outcomes of fiscal policy.

1. Introduction

Economic integration is one of the central issues of contemporary and, probably, future economics. On the occasion of the Centenary of *The Economic Journal*, a number of distinguished economists expressed their views on the prospects for economics in the next hundred years. Several authors (Bhagwati, Malinvaud, Schmalensee, Turnovsky) point at integration as a key topic in economic theorizing.

Van der Ploeg (1991a), in describing the various phases in the process of European integration, suggests that the financial, goods and labour markets are integrating at different speeds. Low labour mobility is expected to be rather persistent, due to impeding factors like language, culture and tradition. On the contrary, there seems to be a strong tendency towards a high degree of financial capital mobility, thanks to, amongst others, virtual absence of transportation costs. Integration of goods markets is considered to take a position somewhere in between. This would be an argument to give priority to financial integration.

There is a reasonable amount of *prima facie* evidence in favour of the

Correspondence to: R. de Groof, Department of Economics, Tilburg University, P.O. Box 90153, 5000LE Tilburg, Netherlands.

*We thank Noud Gruijters, Theo van de Klundert, Rick van der Ploeg, Jacques Sijben and Sjak Smulders for their valuable comments on an earlier draft.

hypothesis of increased integration of financial markets [e.g. Frankel (1989), Keuzenkamp and Van der Ploeg (1990)]. The process of financial integration can be observed from enhanced substitutability of assets and a growing interdependence of yields.

This paper examines the consequences of financial integration for the effects and spill-over effects of fiscal policy. For that purpose, a two-country-two-sector perfect foresight model, allowing for intertemporal government budget constraints, current account dynamics, wealth effects, capital accumulation, imperfect substitutability between home and foreign bonds, floating exchange rates, imperfect substitution between home and foreign tradables, international labour and intersectoral capital immobility, real wage rigidity at home and nominal wage rigidity abroad is formulated.

There is a considerable amount of literature on international interdependent macroeconomics using a portfolio balance framework [e.g. Tobin and De Macedo (1980), Branson and Henderson (1985), Ribe and Beeman (1986), Van de Klundert (1991)]. On the other hand, some work has been done on international interdependent two-sector economies, without or with at best an elementary financial sector [Corden and Turnovsky (1983), Obstfeld (1989), De Groof and Schaling (1991)].

The dominant feature of the present model is the combination of these two frameworks. The portfolio balance approach enables a careful modelling of stock-flow relationships. The distinction between tradables and nontradables opens the possibility of investigating the influence of the composition of a change in government expenditure. In doing so, we try to meet the apparent need for disaggregation, as expressed by, for instance, Allen (1991).

The main findings are as follows. Looking at real disposable income as a measure of the regions' spending power, financial integration appears to have no influence on the qualitative effects and spill-over effects of fiscal policy. This is not the case, if total real output, as a measure of the regions' productive efforts, is taken into account. Then financial integration turns out to be relevant, especially in the long run. However, this only applies to fiscal contractions falling on tradables, which implies, that these long-run (spill-over) effects depend on the commodity composition of the policy pursued.

The paper is organized as follows. In section 2 the model is presented. Its complexity makes an analytical solution intractable. Instead, a comprehensive set of simulations is carried out. Appendix 1 gives the numerical assumptions with respect to the initial steady state situation as well as the situation of a high degree of financial integration. Analytical models sacrifice reality by ruling out several sources of dynamics, in order to keep the analysis manageable. On the other hand, the results of the simulations approach are coefficient specific. To overcome this dilemma, the system has been submitted to extensive sensitivity analysis. To that end, intervals of robustness for all behavioural parameters have been established [cf.

Karakitsos (1989)]. Besides, the role of the economies' sector structure and technology has been critically analyzed.¹ Section 3 presents an overview of the effects and spill-over effects of unilateral fiscal expansions for the reference situation. Section 4 considers the influence of financial integration. For that purpose we compare, in qualitative terms, the effects and spill-over effects of fiscal contractions falling on tradables and nontradables for the reference situation, which is characterized by a low degree of financial integration, with those applying for a situation with a high degree of financial integration. For the short run, the latter case reflects the Mundell-Fleming assumption of uncovered interest parity. In the medium and long run, however, stock-flow effects drive a wedge between home and foreign interest rates. The pursuit of a fiscal contraction seems to be appropriate in the light of, for instance, the persistent U.S. budget deficit and a considerable budgetary problem originated by the German reunification. Appendix 2 contains a number of figures, which may be of some help to understand the dynamics of the system.² Section 5 concludes the paper.

2. A two-country-two-sector model with imperfect substitutability with respect to tradables and financial assets

Following Van de Klundert (1991), we divide the model into subsystems. We distinguish a portfolio, a commodity, a labour and a dynamic subsystem, as well as a subsystem of definitional equations. Apart from nominal wage formation, the two countries are identical.

Lower-case letters refer to real variables, variables expressed as rates are denoted with a 'tilde', while exogenous variables are barred. The subscript i ($i=h, n$) refers to the home tradables sector and the nontradables sector, respectively, while the subscripts j and k ($j=1, 2, k=1, 2, j \neq k$) refer to countries: country 1 stands for Europe and country 2 for the U.S. The superscript e refers to expectational variables. In order to save space we present nominal and real exchange rates as country-specific variables.

The portfolio subsystem

The portfolio subsystem draws on Van de Klundert (1991). Agents spread their real non-human wealth (we) over real cash balances (m), domestic bonds (b_{ji}) and foreign bonds (b_{jk}). Asset demand decisions depend on the

¹For the results of this sensitivity analysis we refer to De Groof and Van Tuijl (1991). In order to determine the role of technology, we reversed the sector's factor intensities as compared to the reference situation, in which tradables production is assumed to be capital intensive [Prachowny (1984), Obstfeld (1988), Verbruggen (1988)].

²Here we limit ourselves to European fiscal contractions. For a complete review we refer to De Groof and Van Tuijl (1991).

rates of return on bonds, which are determined by the nominal interest rates ($\tilde{r}_{nj}$) and the expected change in the nominal exchange rate ($\tilde{e}^e$). The nominal interest rate equals the sum of the real interest rate and the expected rate of CPI inflation ($\tilde{p}_c^e$):

$$\tilde{r}_{nj} = \tilde{r}_j + \tilde{p}_c^e. \quad (1)-(2)$$

For all practical purposes, the real value of bonds is assumed to be fixed within a period [Haas and Masson (1986)]. At the same time, bonds are indexed to the CPI, thus constituting sure claims on given amounts of future consumption goods (baskets). Expectations are assumed to be rational. Furthermore, stochastic components are absent. Therefore, agents have perfect foresight.

Transactions demand for real cash balances is supposed to be related to real disposable income of the private sector [y_d ; see, for instance, Goodhart (1990), pp. 269–270]. Moreover, we ignore currency substitution [McKinnon (1990)]. Under these assumptions the asset demand functions read

$$m_j = m_j^{++-0}(y_d, we_j, \tilde{r}_{nj}, \tilde{r}_{nk} + \tilde{e}_j^e), \quad (3)-(4)$$

$$b_{jj} = b_{jj}^{-++-}(y_d, we_j, \tilde{r}_{nj}, \tilde{r}_{nk} + \tilde{e}_j^e), \quad (5)-(6)$$

$$q_{cj} b_{jk} = q_{cj} b_{jk}^{0++-}(y_d, we_j, \tilde{r}_{nj}, \tilde{r}_{nk} + \tilde{e}_j^e), \quad (7)-(8)$$

where q_{cj} is the real exchange rate applying to country j . The bold signs above variables denote the signs of the partial derivatives. The numerical assumptions are compatible with the familiar ‘adding-up’ constraints [Turnovsky (1977)].

The supply of real cash balances equals the exogenous money stock (M) divided by the CPI:

$$m_j = \frac{M_j}{p_{cj}}. \quad (9)-(10)$$

Net investment of firms is completely financed by issuance of bonds. It is assumed that all transactions are paid for at the beginning of the period. So, investment goods are bought against today's prices. As a result, the amount of bonds supplied by firms is determined by the stock of capital equipment at the beginning of the next period, including net investment of the present period. The supply of government bonds equals outstanding government debt (d), comprising this period's budget deficit as well. For simplicity, it is

assumed that bonds issued by firms and the government are perfect substitutes. Therefore, total domestic bonds' supply (u) reads

$$u_j = \frac{k_{hj+1}p_{hj} + k_{nj+1}p_{nj}}{p_{cj}} + d_j. \quad (11)-(12)$$

Equilibrium in the international bonds markets is stated by

$$u_j = b_{jj} + b_{kj}. \quad (13)-(14)$$

Finally, real wealth consists of real domestic assets and net foreign claims (f)

$$we_j = m_j + u_j + f_j. \quad (15)-(16)$$

The commodity subsystem

The micro-underpinnings of the foregoing portfolio subsystem are no more than rudimentary. In this respect, the commodity expenditure equations show close resemblance, as they lack explicit microfoundations in the form of intertemporal choices made by households and firms as well [as, for example, in Van der Ploeg (1991b)]. As Van de Klundert (1991) observes, a thorough microeconomic foundation of macroeconomics requires an integration of saving, investment and portfolio decisions. Research in this field is still in its infancy [e.g. Rankin (1991)]. Moreover, we agree with Allen (1991, p. 153), who argues that optimizing models can not avoid ad hoc qualities either, be it of a different nature than non-optimizing models.

Total private consumption (c) is split up between consumption of nontradable (c_n) and tradable (c_t) goods. The latter, in turn, is subdivided into home (c_h) and foreign produced (c_m) goods. The complex decision problem with respect to consumption is supposed to be separable.

First, consumers decide upon total consumption expenditure according to

$$c_j = c_j^+ (y_{dj}, we_j, \tilde{r}_{nj} - \tilde{p}_{cj}^e). \quad (17)-(18)$$

Thus, total consumption is positively related to real disposable income (y_d) and real non-human wealth of the private sector (we), whereas it depends negatively on the real interest rate ($\tilde{r}_n - \tilde{p}_c^e$). Assuming consumption to depend on real disposable income implies ascribing naive expectations concerning human wealth to households. Alternatively, one may assume that households are liquidity constrained.

Next, given total consumption demand, consumers choose between tradables and nontradables by maximizing a (CES) utility function. Consumer expenditure on (non-)tradables depends positively on total consumption

expenditure, but negatively on the ratio of the price of (non-)tradables to CPI. Hence, sectoral consumption functions read as

$$c_{tj} = c_t \left(c_j, \frac{\bar{p}_{tj}}{p_{c_j}} \right), \quad (19)-(20)$$

$$c_{nj} = c_n \left(c_j, \frac{\bar{p}_{nj}}{p_{c_j}} \right). \quad (21)-(22)$$

Taking the empirical observations of Deardorff and Stern (1986) into account, home and foreign produced tradables are imperfect substitutes.

Having decided upon total demand for tradable consumption goods and services, consumers choose between home and foreign produced tradables by maximizing another (CES) utility function,

$$c_{hj} = c_h \left(c_{tj}, \frac{\bar{p}_{hj}}{p_{tj}} \right), \quad (23)-(24)$$

$$c_{mj} = c_m \left(c_{tj}, \frac{\bar{p}_{hj} e_j}{p_{tj}} \right), \quad (25)-(26)$$

where p_h denotes the price of home produced tradables.

Entrepreneurs only gradually adapt the stock of capital equipment (k_i) to its desired level (k_i^d). Consequently, net investment is a fraction of the gap between the desired and actual stock of capital. The depreciation of capital is exponential at a rate δ , which is uniform across sectors. Thus, the functions with respect to gross investment are

$$i_{ij} = i_{ij}(k_{ij}^d, k_{ij}). \quad (27)-(30)$$

The sign of the partial derivative of k_i is ambiguous, depending on the ratio of the accelerator coefficient to the rate of technical obsolescence.

The desired stock of capital equipment in any sector follows from the equality of the nominal interest rate ($\bar{r}_n$) and the sector's net marginal physical product of capital plus the expected increase in the value of the sector's capital goods ($\partial y_i / \partial k_i - \delta + \bar{p}_i^e$). The latter equals the expected increase in the sectoral producers' price, since we assume the sector's investment outlays to fall entirely on the goods produced by the sector itself. Allowing for intersectoral and international trade in new capital goods,

would probably not alter the results substantially [Pasinetti (1981), De Groof and Van Tuijl (1991)]. Therefore, the relation for the desired stock of capital equipment can be written as

$$k_{ij}^d = k_{ij}^d (y_{ij}, \tilde{r}_{nj} - \tilde{p}_{ij}^e). \quad (31)-(34)$$

Sectoral outputs (y_i) follow from linear homogeneous (CES) production functions, using inputs of labour (l_i) and sector-specific capital (k_i). Thus,

$$y_{ij} = y_{ij}(l_{ij}, k_{ij}), \quad (35)-(38)$$

where the upper bold signs reflect the signs of the second partial derivatives.

Equilibrium in tradables and nontradables markets is stated by

$$y_{hj} = c_{hj} + i_{hj} + \underline{g}_{hj} + c_{mk} + \underline{g}_{mk}, \quad (39)-(40)$$

$$y_{nj} = c_{nj} + i_{nj} + \underline{g}_{nj}. \quad (41)-(42)$$

Here $\underline{g}_h$ and $\underline{g}_m$ denote exogenous exhaustive government spending on home and foreign produced tradables respectively, while $\underline{g}_n$ indicates exogenous government expenditure on nontradables.

Macroeconomic real output is defined as

$$y_j \equiv \frac{y_{hj}p_{hj} + y_{nj}p_{nj}}{p_{yj}}. \quad (43)-(44)$$

The labour subsystem

Nominal wages are uniform across sectors, owing to the assumption of the homogeneity of labour. However, the labour markets are segmented internationally. Furthermore, they do not clear in the short run, due to rigidity of either nominal wages or real consumers' wages. Empirical evidence points, at least for the short and medium term, to a high degree of nominal wage rigidity in the U.S. and real wage rigidity in Europe [Van der Ploeg (1988)]. For expositional purposes we assume inertia causing (almost) perfect short-run rigidity in the U.S. and Europe, respectively. Empirical evidence does not reject the existence of an error-correction mechanism in the wage relation, ensuring consumers' wages to return to their long-run equilibrium value. We assume a stylized version of this mechanism to apply, so that nominal wages adapt gradually to the labour market situation, as well as to the development of CPI. So, in the long run employment is at its natural rate.

Assuming country-specific labour supply to be exogenous, these conditions imply

$$\Delta w_j = \Delta w_j(\overset{+}{\Delta p_{e_j}}, \overset{+}{l_j}), \quad (45)-(46)$$

in which w and l denote money wage and macroeconomic employment respectively.

Profit maximizing firms equate the marginal product of labour ($\partial y_i / \partial l_i$) and the real producers' wage (w/p_i), with the stock of capital equipment given at each point in time. This results in the following relation for labour demand:

$$l_{ij} = l_{ij} \left(\overset{+}{y_{ij}}, \frac{\bar{w}_j}{p_{ij}} \right). \quad (47)-(50)$$

Macroeconomic employment is defined as

$$l_j \equiv l_{hj} + l_{nj}. \quad (51)-(52)$$

The dynamic subsystem

Capital accumulation reads as

$$\Delta k_{ij} \equiv i_{ij} - \delta k_{ij-1}. \quad (53)-(56)$$

Government outlays, total real government expenditure (g) plus interest payments on outstanding debt, are financed by lump-sum taxes (t), the issuance of bonds, or by means of the 'printing press' (ΔM_j). The selling of bonds raises government debt (d), which immediately becomes clear from writing the government budget *identity* [Buiter (1986)] as

$$\Delta d_j = \tilde{r}_j d_{j-1} + g_j - t_j - \frac{\Delta M_j}{p_{e_j}}. \quad (57)-(58)$$

In order to prevent government debt from escalation, a feedback rule for taxes is specified, since we intend to reserve exhaustive government spending as a policy instrument. A sensible tax rule was introduced by Buiter (1987). Here, it takes the form

$$t_j = t_j(\overset{+}{d_j}). \quad (59)-(60)$$

The real current account surplus of a country, by definition equals the sum of its balance of trade surplus and its capital income account surplus. Under

flexible exchange rates, this sum is equal to the capital account deficit, and, consequently, the increase in country j 's net real foreign asset position.

$$\Delta f_j = \frac{c_{mk} p_{hj} - c_{mj} p_{hk} e_j + g_{mk} p_{hj} - g_{mj} p_{hk} e_j}{p_{cj}} + \tilde{r}_k q_{cj} b_{jk-1} - \tilde{r}_j b_{kj-1} + b_{jk-1} \Delta q_{cj}. \quad (61)-(62)$$

It can easily be verified that $f_k = -f_j/q_{cj}$.

Definitional equations

Real disposable income of the private sector in terms of baskets of consumption goods equals the sum of net value added of firms, interest payments by the domestic government, the capital income account surplus including real-exchange-rate-induced gains on foreign bonds holdings, and the (relative) price-induced wealth effects on physical capital, minus lump-sum as well as inflation taxes. So,

$$y_{dj} \equiv (y_j - \delta k_j) \frac{p_{y_j}}{p_{cj}} + \tilde{r}_j d_{j-1} + \tilde{r}_k q_{cj} b_{jk-1} - \tilde{r}_j b_{kj-1} + b_{jk-1} \Delta q_{cj} + k_{hj} \Delta \frac{p_{hj}}{p_{cj}} + k_{nj} \Delta \frac{p_{nj}}{p_{cj}} - t_j + \frac{M_{j-1}}{p_{cj}} - \frac{M_{j-1}}{p_{cj-1}}. \quad (63)-(64)$$

The producers' price index is defined as

$$p_{y_j} \equiv p_j^{\gamma_{ny}} p_j^{(1-\gamma_{ny})}. \quad (65)-(66)$$

where γ_{ny} is the share of output of home produced tradables in total output.

The 'ideal' price index of tradables consumption can be written as

$$p_{tj} [\gamma_{ht} p_{hj}^{(1-\phi_{hm})} + (1-\gamma_{ht}) (p_{hk} e_j)^{(1-\phi_{hm})}]^{1/(1-\phi_{hm})}, \quad (67)-(68)$$

where γ_{ht} denotes the utility maximizing share of home produced tradables in total consumption of tradables and ϕ_{hm} indicates the elasticity of substitution between home and foreign produced tradables.

Analogously, the ideal CPI reads

$$p_{cj} = [\gamma_{tc} p_{tj}^{(1-\phi_{in})} + (1-\gamma_{tc}) p_{nj}^{(1-\phi_{in})}]^{1/(1-\phi_{in})}, \quad (69)-(70)$$

where γ_{tc} is the optimal share of consumption of tradables in total

consumption expenditure and ϕ_{in} indicates the elasticity of substitution between tradables and nontradables consumption.

The macroeconomic real exchange rate by definition equals

$$q_{cj} \equiv \frac{e_j p_{ck}}{p_{cj}}. \quad (71)$$

Following the Armington tradition rather than assuming the Law of One Price to hold, we have to consider a real exchange rate concerning the tradables sector as well:

$$q_{hj} \equiv \frac{e_j p_{hk}}{p_{hj}}. \quad (72)$$

Evidently, the exchange rates are related as follows:

$$e_k = e_j^{-1}, \quad (73)$$

$$q_{ck} = q_{cj}^{-1}, \quad (74)$$

$$q_{hk} = q_{hj}^{-1}. \quad (75)$$

The system is completed by definitional equations for the macroeconomic stock of capital equipment,

$$k_j \equiv \frac{k_{hj} p_{hj} + k_{nj} p_{nj}}{p_{yj}}, \quad (76)-(77)$$

and real government expenditure, respectively,

$$g_j \equiv \frac{g_{hj} p_{hj} + g_{nj} p_{nj} + g_{mj} p_{hk} e_j}{p_{cj}}. \quad (78)-(79)$$

There are 79 equations in 78 endogenous variables, viz. $\tilde{r}_n, \tilde{r}, m, b_{jj}, b_{jk}, u, we, c, c_t, c_n, c_h, c_m, i_h, i_n, k_h^d, k_n^d, y_h, y_n, y, w, l_h, l_n, l, k_h, k_n, d, g, t, f, y_d, p_h, p_n, p_c, p_t, p_y, e, q_c, q_h, k$.

Invoking Walras' law, one of the equilibrium equations is redundant. As a result, eq. (14), which reflects equilibrium in the market for foreign assets, can be eliminated.

The model contains ten backward-looking state variables viz. k_h, k_n, w, d and f , since these are constrained by their history. The five remaining state variables, p_h, p_n and e_1 are unconstrained by their past and are forward-

Table 1
Reference situation: Effects and spill-over effects of fiscal shocks.

Type of shock Period	$g_{h1} = -1$		$g_{h2} = -1$		$g_{n1} = -1$		$g_{n2} = -1$	
	1	∞	1	∞	1	∞	1	∞
y_{d1}	+	+	+	-	+	+	-	-
y_{d2}	+	-	-	+	-	-	+	+
y_1	+	+	+	+	-	+	-	+
y_2	-	+	-	+	+	+	-	+
y_{h1}	-	+	-	+	+	+	-	+
y_{n1}	+	+	+	-	-	-	-	-
y_{h2}	-	+	-	-	+	+	-	+
y_{n2}	+	-	-	+	+	-	-	-
r_{n1}	-	-	+	-	+	-	-	-
r_{n2}	+	-	-	-	-	-	-	-
r_1	-	-	-	-	+	-	-	-
r_2	-	-	-	-	-	-	-	-
e_1	-	-	+	+	-	-	+	+
q_h	+	+	-	-	+	+	+	-
q_c	-	+	+	-	+	+	-	-
$p_{r1} - p_{n1}$	-	-	-	-	+	-	+	-
$p_{r2} - p_{n2}$	-	-	-	-	+	-	+	-

looking. For saddlepoint stability to hold, one should therefore have ten stable and five unstable roots.

3. International and intersectoral effects and spill-over effects of fiscal shocks

In this section, the international and intersectoral transmission effects of unanticipated once and for all sector-specific fiscal contractions will be studied, by passing in review the qualitative results of numerical exercises. The computations have been carried out with the PSREM package, developed by Van der Ploeg and Markink (1991).³ The numerical assumptions are presented in Appendix 1. It should be stressed that, in the context of a linearized model, the symbols now denote *relative deviations from a steady state solution*.

The qualitative short- and long-term effects and spill-over effects, of the unilateral policy measures mentioned above, are shown in table 1. They will be explained concisely. As mentioned, we will focus on private sector's real disposable income (y_d). However, total real output, will be taken into consideration as well. To be sure, macroeconomic employment deserves as much attention. However, the short-term qualifications for total real output

³This package is suited for dynamic policy simulations of linear models with rational expectations of future events. For the linearized simulations version of our model, we refer to De Groof and Van Tuijl (1991).

also apply to employment, while in the long run the Phillips mechanism invariably restores labour market equilibrium.

The macroeconomic characterisations of the various policies pursued, will be indicated by: 'LOC', 'BLOC', 'BTN' and 'BTS', referring to a 'locomotive', 'backward locomotive', 'beggar-thy-neighbour' and 'beggar-thyself' policy, respectively. These expressions grasp both the effects for the country taking the initiative, as well as spill-over effects for the passive region. They can be defined by means of the following scheme, in which Europe is supposed to take the initiative:

	LOC	BLOC	BTN	BTS
y_{d1}, y_{d2} (or y_1, y_2)	+, +	-, -	+, -	-, +.

If the U.S. takes the initiative, the signs for BTN and BTS are reversed, of course. Unless stated otherwise, a policy designation pertains to disposable income.

In the short run, a *European fiscal contraction falling on home produced tradables*⁴ lowers both the nominal and the real interest rate in Europe. In the U.S., the real interest rate decreases, while the nominal interest rate increases. Evidently, the fall in the real interest rate in Europe is more pronounced than in the U.S., which is the main factor accounting for Europe's capital income account surplus. Europe also runs a trade balance surplus, making its current account surplus substantial. This causes the ECU to appreciate, despite the capital outflow arising from the negative yield differential. Meanwhile, as can also be verified in fig. 1a, the European macroeconomic real exchange rate falls, since the (CPI) deflation differential is dominated by the appreciation of the ECU.

As for the supply side, in the short run sectoral supply solely depends on the sector's real producers' wage. The reduction in government spending on domestic tradables causes an (ex ante) excess supply of European tradables, exerting a downward pressure on its price. This induces European consumers to shift their expenditure towards this type of goods and, therefore, away from both nontradables and U.S. tradables. This leads to a decrease in prices in these sectors too.

The price of U.S.' nontradables slightly rises, which on balance results from U.S.' consumers shifting expenditure away from this type of goods, and a rise in U.S.' total consumption, including nontradables. In the U.S., changes in producers' prices cause opposite changes in the real producers' wages, since in the short run money wages hardly respond to the fall in the

⁴In this article, we confine ourselves to fiscal contractions falling on home produced goods, as this type of fiscal policy seems to be the most obvious one. The case where government expenditure falls on goods of foreign origin is discussed extensively in De Groof and Van Tuijl (1991).

CPI. As a result, a decrease or increase in demand is largely met by lower or higher output. This explains the moderate changes in the U.S.' producers' prices. In Europe the nominal wage rate moves in line with CPI. Consequently, the real producers' wage rate in the tradables sector rises only slightly, whereas it falls in the nontradables sector.

Therefore, the tradables production shows only a small drop, while nontradables output increases significantly. So, in Europe, the main outlet for (ex ante) excess supply or demand are price mutations. It is worthwhile noting, that the European terms of trade ($-q_n$) decrease [see fig. (1a)], while the tradables-nontradables price ratio ($p_t - p_n$) falls in both regions.

European disposable income rises for several reasons. Firstly, taxes are lowered, as the government has less reason to fear a 'runaway debt'. Secondly, real cash balances are increased by deflation. Thirdly, as mentioned above, Europe runs a capital income account surplus. These factors dominate a moderate decrease in total European production in terms of (baskets of) consumption goods. To be sure, European total real output in terms of (baskets of) home produced goods (y_1) increases. However, the fall in the European terms of trade causes the purchasing power of real output ($y_1 + p_{y_1} - p_{c_1}$) to fall. U.S. disposable income also rises, mainly due to the combined effect of higher total output in terms of consumption goods and the increase in real cash balances. As a consequence, in the short run a European fiscal contraction on home produced tradables is a LOC policy.

The understanding of the dynamics of the model may be served by the description of the developments in the medium term, for which we arbitrarily take the third period. In the present case, the medium-term picture shows close resemblance to the one for the short run. At least, LOC is still the correct label. European output in terms of consumption goods has risen, mainly attributable to an increase in nontradables production, arising from a crowding-in of capital investment in the preceding periods. This comes on top of lower taxes, higher real cash balances and a capital income account surplus. The capital income account surplus follows from a sustained current account surplus, which reinforces Europe's position as a net creditor. This causes the ECU to appreciate even further. The European macroeconomic real exchange rate falls as well [see fig. 1(a)], despite European deflation still being comparatively severe. Disposable income of the U.S. is now lower than in the short run, due to a decrease in the value of the U.S.' capital stock, arising from a decrease in the ratio of the price of home tradables to the nontradables price. Here it should be remembered, that the production of tradable goods is assumed to be relatively capital intensive. Yet U.S.' disposable income remains above its initial steady-state level, mainly owing to a rise in the purchasing power of real total output.

Later on, European disposable income gradually increases to a new steady-state level. This must be attributed to lower taxes and a higher capital

Fig. 1. (a) Effects of $g_h = -1$ in case of a low degree of financial integration; (b) effects of $g_h = -1$ in case of a high degree of financial integration.

income account surplus. The increase in real cash balances has come to a complete stop, deflation being absent in the long run ($t \rightarrow \infty$). On the contrary, U.S.' long-run disposable income gets below its initial steady-state level, which must be ascribed to both a higher capital income account deficit and a fall in the real value of European bonds held by U.S.' residents. The latter is induced by an increase in the real exchange rate [see fig. 1(a)], caused by both the appreciation of the ECU and U.S. deflation being

dominated by European deflation in the past. So, in the long run a European fiscal contraction falling on domestic tradables is a BTN policy.

It should be noted, that in the long run Europe's terms of trade has risen [fig. 1(a)], turning its balance of trade into a deficit, which is compatible with the U.S.' enlarged debt service requirements. Real wealth in Europe has grown, as the decrease in domestic bonds, following from a considerable reduction of government debt, falls short of the combined effect of the increased value of real cash balances and foreign asset accumulation. On the contrary, U.S.' long-term real wealth turns out to be lower than its initial steady state level, due to a decrease in all of its components.

A cut in European government expenditure on nontradables is a BTN policy in the short run. Now higher government interest payments, stemming from a rise in the real interest rate, form an additional factor underlying the increase in European disposable income. Logically, the present shock exerts on impact pressure on domestic goods markets. Hence, in the short run deflation in Europe is considerable, causing a substantial increase in real cash balances. This, in turn, boosts real disposable income. The latter causes an even stronger increase in the transactions demand for real cash balances, which underlies the somewhat counter-intuitive rise in both the nominal and the real interest rate.

In the U.S., production increases in both sectors, since both capital investment and exports increase. Another striking difference with the case of a European fiscal contraction falling on domestic tradables, is the increase in the value of the U.S.' capital stock, since now the ratio of the price of U.S.' tradables to nontradables increases. Nevertheless U.S.' disposable income falls, mainly due to a considerable capital income account deficit.

In the long run, a reduction in European government spending on nontradables is a BTN policy. European disposable income has increased even further. Total real output as well as the demand for tradables have risen. The latter mainly stems from higher total consumption, originating from an increase in both disposable income and real wealth. A worsened capital income account is the main factor underlying the fall in the U.S.' disposable income.

Initially, the real exchange rate overshoots its long-term steady state value [see fig. 2(a)]. A substantial appreciation of the nominal exchange rate, outweighing the deflation gap between the U.S. and Europe, features the movement toward its equilibrium value.

A cut in U.S.' exhaustive government spending on domestic tradables turns out to be a BTS policy in the short run. Remember that the corresponding European fiscal contracting is a LOC policy. One should keep in mind, that any discrepancy with the corresponding European demand shock originates from differences in wage formation.

Fig. 2. (a) Effects of $g_{n1} = -1$ in case of a low degree of financial integration; (b) effects of $g_{n1} = -1$ in case of a high degree of financial integration.

The present shock leads to an (ex ante) excess supply of U.S. tradables, which depresses their price. As a result, consumers in both regions shift their expenditure towards U.S. tradables away from European tradables as well as from nontradables. The price of U.S.' nontradables falls as well. In the U.S., real producers' wages rise in both sectors. The fall in demand is to a great extent attended by lower output, thus attenuating the decrease in prices. In Europe, the real producers' wage slightly rises in the tradables sector, whereas it drops in the nontradables sector. Consequently, tradables output shows a moderate decrease, while nontradables production increases. Total

real output grows on balance. The fall in the CPI raises real cash balances, but also contributes to an increase in the real value of U.S.' bonds held by Europeans. These are the factors underlying the rise in disposable income in Europe.

As explained above, if the NWR-country reduces its government expenditure on domestic tradables, it experiences a relatively large decrease in output and a relatively moderate deflation, causing only a small increase in real cash balances. So, disposable income falls, reverse to the former case, in which the active country was characterized by RWR.

Logically, the long term picture is a mirror image of the one discussed before, the RWR-NWR case. In this respect, the type of short- and medium-term wage rigidity is irrelevant, since, by virtue of the Phillips mechanism, unemployment returns to its natural rate. Hence, BTN policy is the correct label.

In case of a *U.S. fiscal contraction falling on nontradables*, BTN suits as a short-term characterization. American workers are locked into nominal wage contracts. This time prices tend to go down considerably, as the fiscal shock is directed at the sheltered sector. This implies a strong rise in real producers' wages and, hence, a substantial decrease in output. However, considerable deflation boosts disposable income for two reasons. Firstly, with the nominal money supply given, real cash balances rise. Secondly, the real exchange rate falls, causing the real value of European bonds in hands of U.S.' residents to increase. Moreover, the U.S.' government can afford to cut taxes, without losing control of its debt. These three factors combined, dominate the decrease in total real output. Therefore, U.S.' real disposable income rises.

In Europe, the real producers' wages increase in both sectors, since the rise in producers' prices falls short of the increase in money wages, which move in line with CPI. A substantial depreciation of the ECU is the main underlying factor. Of course, the level of total real output falls. In the medium run, U.S.' disposable income decreases, as U.S.' residents receive less interest payments from their own government. As a result, their spending power is lower, as compared to the initial steady-state level. In the long run, however, this type of policy recaptures its status as a BTN policy. As mentioned above, the Phillips mechanism restores the natural rate of unemployment. This time, U.S.' tradables production is boosted. On balance, total real output shows a substantial increase. This explains to a great extent the rise in disposable income. Europe continues to be harmed by this policy, due to a capital income account deficit.

A closer look at table 1 reveals that disaggregation matters, at least in the short run. For, the short-term outcomes hinge on whether the government cuts either tradables or nontradables expenditure. On the contrary, in the long run a fiscal contraction invariably turns out to be a BTN policy. Then

the stock-flow interactions, notably the state of the capital income account, arising from the net foreign asset position, dominate the picture.

4. The role of financial integration

This section discusses the consequences of financial integration. Following Feldman (1986), we consider the process of financial integration to have proceeded further, the larger capital flows are provoked by given changes in yield differentials. Alternatively, certain impulses trigger larger capital flows, attenuating yield differentials, the higher the degree of financial integration. So, the international capital movements, resulting from given changes in yield differentials, depend on the elasticity of substitution between home and foreign bonds. The higher the value of this elasticity, the further the process of financial integration has proceeded. In order to track down the influence of financial integration on the (spill-over) effects of fiscal policy, we compare the results of the reference situation, in which the elasticity of substitution is low, with those, in which this parameter takes a high value. In the latter case, one obtains a situation in which any yield differential is absent, at least in the short run. Thus, then the Mundell-Fleming assumption of uncovered interest parity, appropriate indeed for the short term only, applies. However, later on, a wedge between the domestic and the expectations-corrected foreign nominal interest rate emerges, since investors are willing to absorb an increasing supply of bonds from the initiating country in their portfolios, only if the corresponding interest rate is higher.

The results, if different from those in table 1, are presented in table 2. The outcomes concerning real disposable income are perfectly identical to those in the above case of a low degree of financial integration. With respect to total output in terms of home produced goods the results do differ. In the short run, a *European fiscal contraction falling on domestic tradables* would generate a BLOC instead of a BTN policy, and a *U.S.' fiscal contraction on nontradables* constitutes a BTS instead of a LOC policy.

The first difference is caused by a relatively small increase in European nontradables output. A high degree of financial integration implies an intensified capital outflow from Europe. Therefore, Europe needs a larger balance of trade surplus and, therefore, a larger decrease in its terms of trade [see fig. 1(b)]. This implies a relatively small decline in the tradables-nontradables price ratio. Consequently, the difference between the decrease in the CPI and therewith the nominal wage rate on the one hand, and the fall in the price of nontradables on the other hand, is relatively small. Therefore, the real producers' wage in the nontradables sector shows a relatively small decrease, which explains the comparatively small increase in the output of nontradables.

The second difference can be explained in a similar way. The main factor

Table 2

The role of financial integration: deviations from table 1, due to a high degree of financial integration.

Type of shock Period	$\bar{g}_{h1} = -1$		$\bar{g}_{h2} = -1$		$\bar{g}_{n1} = -1$		$\bar{g}_{n2} = -1$	
	1	∞	1	∞	1	∞	1	∞
y_{d1}								
y_{d2}								
y_1	-	-					+	
y_2			-					
y_{h1}		-						
y_{n1}							+	
y_{h2}								
y_{n2}					-			
r_{n1}								
r_{n2}								
r_1								
r_2								
e_1								
q_h		-	+		-		-	+
q_c	+	-	+		-		-	+
$p_{11} - p_{n1}$							-	
$p_{12} - p_{n2}$					-			

underlying this outcome is a rise, instead of a fall, in European nontradables output. A high degree of financial integration implies an influx of capital into Europe. Now Europe can afford a trade balance deficit, since the improvement of its capital account outweighs the worsening of its capital income account. This is compatible with a rise in Europe's terms of trade. Meanwhile, the tradables-nontradables price ratio in Europe decreases, despite the fall in the price of nontradables. The latter follows a shift of consumer expenditure away from nontradable goods. Consequently, the decline in the price on nontradables falls short of the decrease in the CPI and, therefore, money wages. Thus, the real producers' wage falls, implying an increase in nontradables output.

As stated before, in the long run stock-flow interactions dominate the scene. Therefore, divergent long-term outcomes deserve great attention. A *fiscal contraction falling on tradables* turns out to be a BTS-policy instead of a LOC-policy, if macroeconomic output is taken into account. A high degree of financial integration implies intensified capital outflows from the active country. Hence, in the long run the passive country is confronted with a relatively large net foreign debt. As a result, its capital income account shows a substantial deficit. In the long run, the current account is in equilibrium, necessitating a balance of trade surplus of considerable size. Hence, the active country's tradables-output falls, causing total output in terms of home produced goods to decrease.

Meanwhile, as compared to the reference situation, the passive country's tradables-output sharply increases due to a mitigation of the fall in private consumption of home produced tradables. Yet, consumption of tradables decreases considerably, higher net exports filling the gap. In short, the driving force behind the observed departures is the fact, that a high degree of financial integration leads to a comparatively pronounced ultimate net debtor (rentier) position of the passive (active) country.

However, it should be stressed, that the above observations only apply to the *tradables impulses*. The long-run outcome concerning total real output of a *fiscal contraction on nontradables* is still a LOC policy. Under a high degree of capital mobility, the gap between real interest rates is narrowed. Consequently, (crowding in of) capital investment and, therefore, especially the capital intensive production of tradables converge. So, as compared to a fiscal contraction on tradables, the present shock causes the initiating country to raise tradables production in the long run. This explains, why it remains a LOC policy. Nevertheless, in the initiating country, the fall of exports and the increase of imports is relatively steep, which is caused by a relatively large rise in the terms of trade. Thus, in the present case the passive country's balance of trade surplus, necessary to finance its debt service requirements, can be brought about with a relatively small divergence in tradables output.

5. Concluding remarks

The central issue in this paper concerns the influence of financial integration the qualitative (spill-over) effects of fiscal policy. These (spill-over) effects are measured in terms of real disposable income as well as total real output, serving as indicators of the regions' spending power and productive effort, respectively.

Using the first measure, it is shown that, *financial integration does not influence the qualitative (spill-over) effects of fiscal policy*. If total real output is used to characterize the configuration of these (spill-over) effects, financial integration turns out to be relevant for the outcomes of fiscal policy. Especially in the long run, it causes fiscal contraction spent on tradables to generate divergent configurations. Financial integration proves to enlarge the long run net foreign debt of the passive country and, therefore, to reinforce the rentier position of the active country.

Such a divergence is absent, if fiscal contraction falls on nontradables, which is only one out of many indications, that *disaggregation matters*. Sectors are a fact of life and so are governments, buying tradables as well as nontradables. Therefore, predictions concerning the effects of fiscal policy, based on pure macroeconomic analysis, are precarious. This leaves us with

the intriguing problem of the degree of disaggregation, which would indeed permit robust policy statements.

Sensitivity analysis proves the above conclusions to be fairly robust. To be sure, the signs of the policy multipliers are in a measure sensitive to variations in the values of the behavioural parameters, but they prove to change in exactly the same way, in the distinct situations of a low and a high degree of financial integration. Sensitivity analysis also shows the above results to depend on the relative factor intensity of the sectors involved. Obstfeld (1988), reaches the same conclusion, although in our analysis this 'natural assumption' of nontradables being relatively labour intensive, is not as crucial as in his study. Moreover, the relative size of the tradables and nontradables sector proves to be of limited importance to our inferences.

Financial, goods and labour markets integration are considered to be successive phases in the process towards full economic integration. The analysis of the latter two phases can be accomplished within the present framework.

In a substantial number of cases, the results with respect to total output are compounds of opposite results for the sectors involved. A crucial condition here is, that the assumed excess supply of labour in one sector can be transferred costlessly to the other. This raises the question of what happens, if labour, qualified for work in the expanding sector, may become a bottle-neck. This would be due to labour being sector-specific, at least temporary. Such an assumption could prevent unemployed workers to move from the contracting sector towards the work available in the prosperous sector. The existence of imperfect intersectoral labour mobility may force a country to undergo a costly reallocation process with employment and output losses. Allowing for heterogeneity of labour, therefore, is another possible extension of the present analysis.

Appendix 1: Numerical assumptions

Parameter values for the reference situation/situation of a high degree of financial integration

Partial demand elasticities:

(disposable) income-elasticity of real cash balances = 1.0;

interest-elasticity of real cash balances = 0.3;

(disposable) income elasticity of home bonds = 0.083;

elasticity of home bonds held by residents with respect to the domestic nominal interest rate = 0.22/2.687;

elasticity of home bonds held by residents with respect to the expected yield on foreign bonds = 0.2/2.667;

elasticity of foreign bonds held by residents with respect to the domestic nominal interest rate = 0.78/10.647;

elasticity of foreign bonds held by residents with respect to the expected yield on foreign bonds = $0.8/10.667$;
 (disposable) income-elasticity of private consumption = 0.8;
 interest-elasticity of private consumption = 0.225;
 (real) wealth-elasticity of private consumption = 0.1.

Elasticities of substitution:

between domestic and foreign bonds = $1/13.33$;
 between tradable and nontradable consumption goods = 1.5;
 between 'home produced' and 'foreign produced' tradable consumption goods = 5.0;
 between capital and labour in the tradables-sector = 0.55;
 between capital and labour in the nontradables-sector = 0.55.

Other behavioural parameters:

acceleration coefficient = 0.08;
 tax rule feedback coefficient = 0.5;
 real wage inertia coefficient for Europe = 0.999;
 real wage inertia coefficient for the U.S. = 0.001;
 Phillips coefficient = 0.1.

Initial steady state ratio of:

bonds issued by firms to total supply of bonds = 0.8;
 real cash balances to output = 0.25;
 holdings of domestic bonds to total bonds holdings of residents = 0.8;
 private sector's imports (exports) to tradables-output = 0.2667;
 government imports to tradables output = 0.0533;
 private consumption of 'home produced' tradables by residents to tradables output = 0.4;
 private consumption of nontradables to nontradables output = 0.6667;
 government expenditure on 'home produced' tradables to tradables output = 0.08;
 government expenditure on nontradables to nontradables output = 0.2;
 gross capital investment to tradables output = 0.2;
 gross capital investment to nontradables output = 0.1333;
 tradables output to total output = 0.5;
 consumption of tradables to total private consumption = 0.5;
 consumption of 'home produced' tradables to total tradables consumption = 0.6;
 lump sum taxes to total output = 0.2;
 government debt to total output = 0.75.

Other non-behavioural parameters:

rate of technical obsolescence = 0.0556;
 capital-output ratio in the tradables sector = 3.6;
 capital-output ratio in the nontradables sector = 2.4;
 wage share in the tradables sector = 0.64;
 wage share in the nontradables sector = 0.76;
 real interest rate = 0.0444.

References

- Allen, P.R., 1991, Open economy macroeconomics, a review essay, *Journal of Monetary Economics* 27, 151-156.
- Branson, W., 1983, Macroeconomic determinants of real exchange rate risk, in: R.J. Herring, ed., *Managing foreign exchange risk* (Cambridge University Press, Cambridge) 33-74.
- Branson, W. and D.W. Henderson, 1985, The specification and influence of asset markets, in: R.W. Jones and P.B. Kenen, eds., *Handbook of international economics*, Vol. 2 (Elsevier Science Publishers B.V., Amsterdam) 749-805.
- Buiter, W., 1986, Fiscal prerequisites for a viable managed exchange rate regime: A non-technical eclectic introduction, *Praeadviezen voor de Vereniging voor de Staathuishoudkunde* (Stenfert Kroese, Leiden) 99-117.
- Buiter, W., 1987, Fiscal policy in open interdependent economies, in: A. Razin and E. Sadka, eds., *Economic policy in theory and practice* (Macmillan, London) 101-104.
- Corden, W. and S. Turnovsky, 1983, Negative international transmission of economic expansion, *European Economic Review* 16, 291-310.
- Deardorff, A.V. and R.M. Stern, 1986, *The Michigan model of world production and trade: Theory and applications* (MIT Press, Cambridge).
- Economic Journal, The, 101, 1991, no. 404.
- Feldman, R., 1986, *Japanese financial markets: Deficits, dilemma, and deregulation* (MIT Press, Cambridge).
- Frankel, J.A., 1989, Quantifying capital mobility in the 1980's, Working paper 2856 (NBER, Cambridge, MA).
- Frenkel, J.A. and A. Razin, 1987, *Fiscal policies and the world economy* (MIT Press, Cambridge).
- Goodhart, C., 1989, Money, information and uncertainty (Macmillan, London, New York).
- De Groof, R.J. and E. Schaling, 1991, Monetary and fiscal policy in interdependent two-sector economies, *De Economist* 139, 427-444.
- De Groof, R.J. and M.A. van Tuijl, 1991, Financial integration and fiscal policy in interdependent two-sector economies with real and nominal wage rigidity, Research memorandum no. 526 (Tilburg University).
- De Groof, R.J. and M.A. van Tuijl, 1992, Budgettaire politiek, interdependentie en sectoranalyse (Fiscal policy, interdependence and mesoeconomics), *Maandschrift Economie* 56, 24-41.
- Haas, R.D. and P.R. Masson, 1986, MINIMOD: Specification, simulation and results, *IMF Staff Papers* 33, no. 4, 722-767.
- Karakitsos, E., 1989, Monetary policy, exchange rate dynamics and the labour market, *Oxford Economic Papers* 41, 410-433.
- Keuzenkamp, H.A. and F. van der Ploeg, 1990, Saving, investment, government finance and the current account: The Dutch experience, Discussion paper no. 9049 (Center for Economic Research, Tilburg University).
- Van de Klundert, Th., 1990, Crowding out of private and public capital accumulation in an international context, Mimeo. (Tilburg University).
- Van de Klundert, Th., 1991, Reducing external debt in a world with imperfect asset and commodity substitution, *European Journal of Political Economy* 7, 17-40.
- McKinnon, R.I., 1990, Why floating exchange rates fail: A reconsideration of the liquidity trap, *Open Economies Review* 1, 229-250.

- Obstfeld, M., 1989, Fiscal deficits and relative prices in a growing world economy, *Journal of Monetary Economics* 23, 461-484.
- Prachowny, M.F., 1984, *Macroeconomic analysis for small open economies* (Clarendon Press, Oxford).
- Pasinetti, L., 1981, *Structural change and economic growth: A theoretical essay on the dynamics of the wealth of nations* (Cambridge University Press).
- Van der Ploeg, F., 1988, International interdependence and policy coordination in the OECD economies, *Greek Economic Review* 10, 1-48.
- Van der Ploeg, F., 1991a, Macroeconomic policy coordination issues during the various phases of economic and monetary integration in Europe, *European economy - The economics of EMU*, Commission of the European Communities, special edition no. 1, 136-164.
- Van der Ploeg, F., 1991b, Money and capital in interdependent economies with overlapping generations, *Economica* 58, 233-256.
- Van der Ploeg, F. and A.J. Markink, 1991, Dynamic policy in linear models with rational expectations of future events, A computer package, *Computer Science in Economics and Management* 4, 175-199.
- Rankin, N., 1991, Exchange rate risk and imperfect capital mobility in an optimising model, Discussion paper no. 9116 (Center for Economic Research, Tilburg University).
- Ribe, F.C. and W.J. Beeman, 1986, The monetary-fiscal mix and long-run growth in an open economy, *American Economic Review, Papers and Proceedings*.
- Tobin, J. and J.B. de Macedo, 1980, The short-run macroeconomics of floating exchange rates: An exposition, in: J. Chipman and C. Kindleberger, eds., *Flexible exchange rates and the balance of payments* (North-Holland, Amsterdam) 5-27.
- Turnovsky, S., 1977, *Macroeconomic analysis and stabilization policy* (Cambridge University Press) ch. 3.
- Verbruggen, J.P., 1988, Two recent trends combined in an econometric model for the Netherlands: the supply-side and sectoral approach in: H. Motamen, ed., *Economic modelling in the OECD countries* (Chapman and Hall, London, New York) 353-380.

Reprint Series, CentER, Tilburg University, The Netherlands:

- No. 1 G. Marini and F. van der Ploeg, Monetary and fiscal policy in an optimising model with capital accumulation and finite lives, *The Economic Journal*, vol. 98, no. 392, 1988, pp. 772 - 786.
- No. 2 F. van der Ploeg, International policy coordination in interdependent monetary economies, *Journal of International Economics*, vol. 25, 1988, pp. 1 - 23.
- No. 3 A.P. Barten, The history of Dutch macroeconomic modelling (1936-1986), in W. Driehuis, M.M.G. Fase and H. den Hartog (eds.), *Challenges for Macroeconomic Modelling*, Contributions to Economic Analysis 178, Amsterdam: North-Holland, 1988, pp. 39 - 88.
- No. 4 F. van der Ploeg, Disposable income, unemployment, inflation and state spending in a dynamic political-economic model, *Public Choice*, vol. 60, 1989, pp. 211 - 239.
- No. 5 Th. ten Raa and F. van der Ploeg, A statistical approach to the problem of negatives in input-output analysis, *Economic Modelling*, vol. 6, no. 1, 1989, pp. 2 - 19.
- No. 6 E. van Damme, Renegotiation-proof equilibria in repeated prisoners' dilemma, *Journal of Economic Theory*, vol. 47, no. 1, 1989, pp. 206 - 217.
- No. 7 C. Mulder and F. van der Ploeg, Trade unions, investment and employment in a small open economy: a Dutch perspective, in J. Muysken and C. de Neubourg (eds.), *Unemployment in Europe*, London: The Macmillan Press Ltd, 1989, pp. 200 - 229.
- No. 8 Th. van de Klundert and F. van der Ploeg, Wage rigidity and capital mobility in an optimizing model of a small open economy, *De Economist*, vol. 137, nr. 1, 1989, pp. 47 - 75.
- No. 9 G. Dhaene and A.P. Barten, When it all began: the 1936 Tinbergen model revisited, *Economic Modelling*, vol. 6, no. 2, 1989, pp. 203 - 219.
- No. 10 F. van der Ploeg and A.J. de Zeeuw, Conflict over arms accumulation in market and command economies, in F. van der Ploeg and A.J. de Zeeuw (eds.), *Dynamic Policy Games in Economics*, Contributions to Economic Analysis 181, Amsterdam: Elsevier Science Publishers B.V. (North-Holland), 1989, pp. 91 - 119.
- No. 11 J. Driffill, Macroeconomic policy games with incomplete information: some extensions, in F. van der Ploeg and A.J. de Zeeuw (eds.), *Dynamic Policy Games in Economics*, Contributions to Economic Analysis 181, Amsterdam: Elsevier Science Publishers B.V. (North-Holland), 1989, pp. 289 - 322.
- No. 12 F. van der Ploeg, Towards monetary integration in Europe, in P. De Grauwe et al., *De Europese Monetaire Integratie: vier visies*, Wetenschappelijke Raad voor het Regeringsbeleid V 66, 's-Gravenhage: SDU uitgeverij, 1989, pp. 81 - 106.

- No. 13 R.J.M. Alessie and A. Kapteyn, Consumption, savings and demography, in A. Wenig, K.F. Zimmermann (eds.), *Demographic Change and Economic Development*, Berlin/Heidelberg: Springer-Verlag, 1989, pp. 272 - 305.
- No. 14 A. Hoque, J.R. Magnus and B. Pesaran, The exact multi-period mean-square forecast error for the first-order autoregressive model, *Journal of Econometrics*, vol. 39, no. 3, 1988, pp. 327 - 346.
- No. 15 R. Alessie, A. Kapteyn and B. Melenberg, The effects of liquidity constraints on consumption: estimation from household panel data, *European Economic Review*, vol. 33, no. 2/3, 1989, pp. 547 - 555.
- No. 16 A. Holly and J.R. Magnus, A note on instrumental variables and maximum likelihood estimation procedures, *Annales d'Économie et de Statistique*, no. 10, April-June, 1988, pp. 121 - 138.
- No. 17 P. ten Hacken, A. Kapteyn and I. Woittiez, Unemployment benefits and the labor market, a micro/macro approach, in B.A. Gustafsson and N. Anders Klevmarken (eds.), *The Political Economy of Social Security*, Contributions to Economic Analysis 179, Amsterdam: Elsevier Science Publishers B.V. (North-Holland), 1989, pp. 143 - 164.
- No. 18 T. Wansbeek and A. Kapteyn, Estimation of the error-components model with incomplete panels, *Journal of Econometrics*, vol. 41, no. 3, 1989, pp. 341 - 361.
- No. 19 A. Kapteyn, P. Kooreman and R. Willemse, Some methodological issues in the implementation of subjective poverty definitions, *The Journal of Human Resources*, vol. 23, no. 2, 1988, pp. 222 - 242.
- No. 20 Th. van de Klundert and F. van der Ploeg, Fiscal policy and finite lives in interdependent economies with real and nominal wage rigidity, *Oxford Economic Papers*, vol. 41, no. 3, 1989, pp. 459 - 489.
- No. 21 J.R. Magnus and B. Pesaran, The exact multi-period mean-square forecast error for the first-order autoregressive model with an intercept, *Journal of Econometrics*, vol. 42, no. 2, 1989, pp. 157 - 179.
- No. 22 F. van der Ploeg, Two essays on political economy: (i) The political economy of overvaluation, *The Economic Journal*, vol. 99, no. 397, 1989, pp. 850 - 855; (ii) Election outcomes and the stockmarket, *European Journal of Political Economy*, vol. 5, no. 1, 1989, pp. 21 - 30.
- No. 23 J.R. Magnus and A.D. Woodland, On the maximum likelihood estimation of multivariate regression models containing serially correlated error components, *International Economic Review*, vol. 29, no. 4, 1988, pp. 707 - 725.
- No. 24 A.J.J. Talman and Y. Yamamoto, A simplicial algorithm for stationary point problems on polytopes, *Mathematics of Operations Research*, vol. 14, no. 3, 1989, pp. 383 - 399.
- No. 25 E. van Damme, Stable equilibria and forward induction, *Journal of Economic Theory*, vol. 48, no. 2, 1989, pp. 476 - 496.

- No. 26 A.P. Barten and L.J. Bettendorf, Price formation of fish: An application of an inverse demand system, *European Economic Review*, vol. 33, no. 8, 1989, pp. 1509 - 1525.
- No. 27 G. Noldeke and E. van Damme, Signalling in a dynamic labour market, *Review of Economic Studies*, vol. 57 (1), no. 189, 1990, pp. 1 - 23.
- No. 28 P. Kop Jansen and Th. ten Raa, The choice of model in the construction of input-output coefficients matrices, *International Economic Review*, vol. 31, no. 1, 1990, pp. 213 - 227.
- No. 29 F. van der Ploeg and A.J. de Zeeuw, Perfect equilibrium in a model of competitive arms accumulation, *International Economic Review*, vol. 31, no. 1, 1990, pp. 131 - 146.
- No. 30 J.R. Magnus and A.D. Woodland, Separability and aggregation, *Economica*, vol. 57, no. 226, 1990, pp. 239 - 247.
- No. 31 F. van der Ploeg, International interdependence and policy coordination in economies with real and nominal wage rigidity, *Greek Economic Review*, vol. 10, no. 1, June 1988, pp. 1 - 48.
- No. 32 E. van Damme, Signaling and forward induction in a market entry context, *Operations Research Proceedings 1989*, Berlin-Heidelberg: Springer-Verlag, 1990, pp. 45 - 59.
- No. 33 A.P. Barten, Toward a levels version of the Rotterdam and related demand systems, *Contributions to Operations Research and Economics*, Cambridge: MIT Press, 1989, pp. 441 - 465.
- No. 34 F. van der Ploeg, International coordination of monetary policies under alternative exchange-rate regimes, in F. van der Ploeg (ed.), *Advanced Lectures in Quantitative Economics*, London-Orlando: Academic Press Ltd., 1990, pp. 91 - 121.
- No. 35 Th. van de Klundert, On socioeconomic causes of 'wait unemployment', *European Economic Review*, vol. 34, no. 5, 1990, pp. 1011 - 1022.
- No. 36 R.J.M. Alessie, A. Kapteyn, J.B. van Lochem and T.J. Wansbeek, Individual effects in utility consistent models of demand, in J. Hartog, G. Ridder and J. Theeuwes (eds.), *Panel Data and Labor Market Studies*, Amsterdam: Elsevier Science Publishers B.V. (North-Holland), 1990, pp. 253 - 278.
- No. 37 F. van der Ploeg, Capital accumulation, inflation and long-run conflict in international objectives, *Oxford Economic Papers*, vol. 42, no. 3, 1990, pp. 501 - 525.
- No. 38 Th. Nijman and F. Palm, Parameter identification in ARMA Processes in the presence of regular but incomplete sampling, *Journal of Time Series Analysis*, vol. 11, no. 3, 1990, pp. 239 - 248.
- No. 39 Th. van de Klundert, Wage differentials and employment in a two-sector model with a dual labour market, *Metroeconomica*, vol. 40, no. 3, 1989, pp. 235 - 256.

- No. 40 Th. Nijman and M.F.J. Steel, Exclusion restrictions in instrumental variables equations, *Econometric Reviews*, vol. 9, no. 1, 1990, pp. 37 - 55.
- No. 41 A. van Soest, I. Woittiez and A. Kapteyn, Labor supply, income taxes, and hours restrictions in the Netherlands, *Journal of Human Resources*, vol. 25, no. 3, 1990, pp. 517 - 558.
- No. 42 Th.C.M.J. van de Klundert and A.B.T.M. van Schaik, Unemployment persistence and loss of productive capacity: a Keynesian approach, *Journal of Macro- economics*, vol. 12, no. 3, 1990, pp. 363 - 380.
- No. 43 Th. Nijman and M. Verbeek, Estimation of time-dependent parameters in linear models using cross-sections, panels, or both, *Journal of Econometrics*, vol. 46, no. 3, 1990, pp. 333 - 346.
- No. 44 E. van Damme, R. Selten and E. Winter, Alternating bid bargaining with a smallest money unit, *Games and Economic Behavior*, vol. 2, no. 2, 1990, pp. 188 - 201.
- No. 45 C. Dang, The D_1 -triangulation of $\mathbb{R}^n$ for simplicial algorithms for computing solutions of nonlinear equations, *Mathematics of Operations Research*, vol. 16, no. 1, 1991, pp. 148 - 161.
- No. 46 Th. Nijman and F. Palm, Predictive accuracy gain from disaggregate sampling in ARIMA models, *Journal of Business & Economic Statistics*, vol. 8, no. 4, 1990, pp. 405 - 415.
- No. 47 J.R. Magnus, On certain moments relating to ratios of quadratic forms in normal variables: further results, *Sankhya: The Indian Journal of Statistics*, vol. 52, series B, part. 1, 1990, pp. 1 - 13.
- No. 48 M.F.J. Steel, A Bayesian analysis of simultaneous equation models by combining recursive analytical and numerical approaches, *Journal of Econometrics*, vol. 48, no. 1/2, 1991, pp. 83 - 117.
- No. 49 F. van der Ploeg and C. Withagen, Pollution control and the ramsey problem, *Environmental and Resource Economics*, vol. 1, no. 2, 1991, pp. 215 - 236.
- No. 50 F. van der Ploeg, Money and capital in interdependent economies with overlapping generations, *Economica*, vol. 58, no. 230, 1991, pp. 233 - 256.
- No. 51 A. Kapteyn and A. de Zeeuw, Changing incentives for economic research in the Netherlands, *European Economic Review*, vol. 35, no. 2/3, 1991, pp. 603 - 611.
- No. 52 C.G. de Vries, On the relation between GARCH and stable processes, *Journal of Econometrics*, vol. 48, no. 3, 1991, pp. 313 - 324.
- No. 53 R. Alessie and A. Kapteyn, Habit formation, interdependent preferences and demographic effects in the almost ideal demand system, *The Economic Journal*, vol. 101, no. 406, 1991, pp. 404 - 419.
- No. 54 W. van Groenendaal and A. de Zeeuw, Control, coordination and conflict on international commodity markets, *Economic Modelling*, vol. 8, no. 1, 1991, pp. 90 - 101.

- No. 55 F. van der Ploeg and A.J. Markink, Dynamic policy in linear models with rational expectations of future events: A computer package, *Computer Science in Economics and Management*, vol. 4, no. 3, 1991, pp. 175 - 199.
- No. 56 H.A. Keuzenkamp and F. van der Ploeg, Savings, investment, government finance, and the current account: The Dutch experience, in G. Alogoskoufis, L. Papademos and R. Portes (eds.), *External Constraints on Macroeconomic Policy: The European Experience*, Cambridge: Cambridge University Press, 1991, pp. 219 - 263.
- No. 57 Th. Nijman, M. Verbeek and A. van Soest, The efficiency of rotating-panel designs in an analysis-of-variance model, *Journal of Econometrics*, vol. 49, no. 3, 1991, pp. 373 - 399.
- No. 58 M.F.J. Steel and J.-F. Richard, Bayesian multivariate exogeneity analysis - an application to a UK money demand equation, *Journal of Econometrics*, vol. 49, no. 1/2, 1991, pp. 239 - 274.
- No. 59 Th. Nijman and F. Palm, Generalized least squares estimation of linear models containing rational future expectations, *International Economic Review*, vol. 32, no. 2, 1991, pp. 383 - 389.
- No. 60 E. van Damme, Equilibrium selection in 2 x 2 games, *Revista Espanola de Economia*, vol. 8, no. 1, 1991, pp. 37 - 52.
- No. 61 E. Bennett and E. van Damme, Demand commitment bargaining: the case of apex games, in R. Selten (ed.), *Game Equilibrium Models III - Strategic Bargaining*, Berlin: Springer-Verlag, 1991, pp. 118 - 140.
- No. 62 W. Güth and E. van Damme, Gorbey games - a game theoretic analysis of disarmament campaigns and the defense efficiency - hypothesis -, in R. Avenhaus, H. Karkar and M. Rudnianski (eds.), *Defense Decision Making - Analytical Support and Crisis Management*, Berlin: Springer-Verlag, 1991, pp. 215 - 240.
- No. 63 A. Roell, Dual-capacity trading and the quality of the market, *Journal of Financial Intermediation*, vol. 1, no. 2, 1990, pp. 105 - 124.
- No. 64 Y. Dai, G. van der Laan, A.J.J. Talman and Y. Yamamoto, A simplicial algorithm for the nonlinear stationary point problem on an unbounded polyhedron, *Siam Journal of Optimization*, vol. 1, no. 2, 1991, pp. 151 - 165.
- No. 65 M. McAleer and C.R. McKenzie, Keynesian and new classical models of unemployment revisited, *The Economic Journal*, vol. 101, no. 406, 1991, pp. 359 - 381.
- No. 66 A.J.J. Talman, General equilibrium programming, *Nieuw Archief voor Wiskunde*, vol. 8, no. 3, 1990, pp. 387 - 397.
- No. 67 J.R. Magnus and B. Pesaran, The bias of forecasts from a first-order autoregression, *Econometric Theory*, vol. 7, no. 2, 1991, pp. 222 - 235.

- No. 68 F. van der Ploeg, Macroeconomic policy coordination issues during the various phases of economic and monetary integration in Europe, *European Economy - The Economics of EMU*, Commission of the European Communities, special edition no. 1, 1991, pp. 136 - 164.
- No. 69 H. Keuzenkamp, A precursor to Muth: Tinbergen's 1932 model of rational expectations, *The Economic Journal*, vol. 101, no. 408, 1991, pp. 1245 - 1253.
- No. 70 L. Zou, The target-incentive system vs. the price-incentive system under adverse selection and the ratchet effect, *Journal of Public Economics*, vol. 46, no. 1, 1991, pp. 51 - 89.
- No. 71 E. Bomhoff, Between price reform and privatization: Eastern Europe in transition, *Finanzmarkt und Portfolio Management*, vol. 5, no. 3, 1991, pp. 241 - 251.
- No. 72 E. Bomhoff, Stability of velocity in the major industrial countries: a Kalman filter approach, *International Monetary Fund Staff Papers*, vol. 38, no. 3, 1991, pp. 626 - 642.
- No. 73 E. Bomhoff, Currency convertibility: when and how? A contribution to the Bulgarian debate, *Kredit und Kapital*, vol. 24, no. 3, 1991, pp. 412 - 431.
- No. 74 H. Keuzenkamp and F. van der Ploeg, Perceived constraints for Dutch unemployment policy, in C. de Neubourg (ed.), *The Art of Full Employment - Unemployment Policy in Open Economies*, Contributions to Economic Analysis 203, Amsterdam: Elsevier Science Publishers B.V. (North-Holland), 1991, pp. 7 - 37.
- No. 75 H. Peters and E. van Damme, Characterizing the Nash and Raiffa bargaining solutions by disagreement point axioms, *Mathematics of Operations Research*, vol. 16, no. 3, 1991, pp. 447 - 461.
- No. 76 P.J. Deschamps, On the estimated variances of regression coefficients in misspecified error components models, *Econometric Theory*, vol. 7, no. 3, 1991, pp. 369 - 384.
- No. 77 A. de Zeeuw, Note on 'Nash and Stackelberg solutions in a differential game model of capitalism', *Journal of Economic Dynamics and Control*, vol. 16, no. 1, 1992, pp. 139 - 145.
- No. 78 J.R. Magnus, On the fundamental bordered matrix of linear estimation, in F. van der Ploeg (ed.), *Advanced Lectures in Quantitative Economics*, London-Orlando: Academic Press Ltd., 1990, pp. 583 - 604.
- No. 79 F. van der Ploeg and A. de Zeeuw, A differential game of international pollution control, *Systems and Control Letters*, vol. 17, no. 6, 1991, pp. 409 - 414.
- No. 80 Th. Nijman and M. Verbeek, The optimal choice of controls and pre-experimental observations, *Journal of Econometrics*, vol. 51, no. 1/2, 1992, pp. 183 - 189.
- No. 81 M. Verbeek and Th. Nijman, Can cohort data be treated as genuine panel data?, *Empirical Economics*, vol. 17, no. 1, 1992, pp. 9 - 23.

- No. 82 E. van Damme and W. Güth, Equilibrium selection in the Spence signaling game, in R. Selten (ed.), *Game Equilibrium Models II - Methods, Morals, and Markets*, Berlin: Springer-Verlag, 1991, pp. 263 - 288.
- No. 83 R.P. Gilles and P.H.M. Ruys, Characterization of economic agents in arbitrary communication structures, *Nieuw Archief voor Wiskunde*, vol. 8, no. 3, 1990, pp. 325 - 345.
- No. 84 A. de Zeeuw and F. van der Ploeg, Difference games and policy evaluation: a conceptual framework, *Oxford Economic Papers*, vol. 43, no. 4, 1991, pp. 612 - 636.
- No. 85 E. van Damme, Fair division under asymmetric information, in R. Selten (ed.), *Rational Interaction - Essays in Honor of John C. Harsanyi*, Berlin/Heidelberg: Springer-Verlag, 1992, pp. 121 - 144.
- No. 86 F. de Jong, A. Kemna and T. Kloek, A contribution to event study methodology with an application to the Dutch stock market, *Journal of Banking and Finance*, vol. 16, no. 1, 1992, pp. 11 - 36.
- No. 87 A.P. Barten, The estimation of mixed demand systems, in R. Bewley and T. Van Hoa (eds.), *Contributions to Consumer Demand and Econometrics, Essays in Honour of Henri Theil*, Basingstoke: The Macmillan Press Ltd., 1992, pp. 31 - 57.
- No. 88 T. Wansbeek and A. Kapteyn, Simple estimators for dynamic panel data models with errors in variables, in R. Bewley and T. Van Hoa (eds.), *Contributions to Consumer Demand and Econometrics, Essays in Honour of Henri Theil*, Basingstoke: The Macmillan Press Ltd., 1992, pp. 238 - 251.
- No. 89 S. Chib, J. Osiewalski and M. Steel, Posterior inference on the degrees of freedom parameter in multivariate-*t* regression models, *Economics Letters*, vol. 37, no. 4, 1991, pp. 391 - 397.
- No. 90 H. Peters and P. Wakker, Independence of irrelevant alternatives and revealed group preferences, *Econometrica*, vol. 59, no. 6, 1991, pp. 1787 - 1801.
- No. 91 G. Alogoskoufis and F. van der Ploeg, On budgetary policies, growth, and external deficits in an interdependent world, *Journal of the Japanese and International Economies*, vol. 5, no. 4, 1991, pp. 305 - 324.
- No. 92 R.P. Gilles, G. Owen and R. van den Brink, Games with permission structures: The conjunctive approach, *International Journal of Game Theory*, vol. 20, no. 3, 1992, pp. 277 - 293.
- No. 93 J.A.M. Potters, I.J. Curiel and S.H. Tijs, Traveling salesman games, *Mathematical Programming*, vol. 53, no. 2, 1992, pp. 199 - 211.
- No. 94 A.P. Jurg, M.J.M. Jansen, J.A.M. Potters and S.H. Tijs, A symmetrization for finite two-person games, *Zeitschrift für Operations Research - Methods and Models of Operations Research*, vol. 36, no. 2, 1992, pp. 111 - 123.

- No. 95 A. van den Nouweland, P. Borm and S. Tijs, Allocation rules for hypergraph communication situations, *International Journal of Game Theory*, vol. 20, no. 3, 1992, pp. 255 - 268.
- No. 96 E.J. Bomhoff, Monetary reform in Eastern Europe, *European Economic Review*, vol. 36, no. 2/3, 1992, pp. 454 - 458.
- No. 97 F. van der Ploeg and A. de Zeeuw, International aspects of pollution control, *Environmental and Resource Economics*, vol. 2, no. 2, 1992, pp. 117 - 139.
- No. 98 P.E.M. Borm and S.H. Tijs, Strategic claim games corresponding to an NTU-game, *Games and Economic Behavior*, vol. 4, no. 1, 1992, pp. 58 - 71.
- No. 99 A. van Soest and P. Kooreman, Coherency of the indirect translog demand system with binding nonnegativity constraints, *Journal of Econometrics*, vol. 44, no. 3, 1990, pp. 391 - 400.
- No. 100 Th. ten Raa and E.N. Wolff, Secondary products and the measurement of productivity growth, *Regional Science and Urban Economics*, vol. 21, no. 4, 1991, pp. 581 - 615.
- No. 101 P. Kooreman and A. Kapteyn, On the empirical implementation of some game theoretic models of household labor supply, *The Journal of Human Resources*, vol. 25, no. 4, 1990, pp. 584 - 598.
- No. 102 H. Bester, Bertrand equilibrium in a differentiated duopoly, *International Economic Review*, vol. 33, no. 2, 1992, pp. 433 - 448.
- No. 103 J.A.M. Potters and S.H. Tijs, The nucleolus of a matrix game and other nucleoli, *Mathematics of Operations Research*, vol. 17, no. 1, 1992, pp. 164 - 174.
- No. 104 A. Kapteyn, P. Kooreman and A. van Soest, Quantity rationing and concavity in a flexible household labor supply model, *Review of Economics and Statistics*, vol. 72, no. 1, 1990, pp. 55 - 62.
- No. 105 A. Kapteyn and P. Kooreman, Household labor supply: What kind of data can tell us how many decision makers there are?, *European Economic Review*, vol. 36, no. 2/3, 1992, pp. 365 - 371.
- No. 106 Th. van de Klundert and S. Smulders, Reconstructing growth theory: A survey, *De Economist*, vol. 140, no. 2, 1992, pp. 177 - 203.
- No. 107 N. Rankin, Imperfect competition, expectations and the multiple effects of monetary growth, *The Economic Journal*, vol. 102, no. 413, 1992, pp. 743 - 753.
- No. 108 J. Greenberg, On the sensitivity of von Neumann and Morgenstern abstract stable sets: The stable and the individual stable bargaining set, *International Journal of Game Theory*, vol. 21, no. 1, 1992, pp. 41 - 55.
- No. 109 S. van Wijnbergen, Trade reform, policy uncertainty, and the current account: A non-expected-utility approach, *American Economic Review*, vol. 82, no. 3, 1992, pp. 626 - 633.

- No. 110 M. Verbeek and Th. Nijman, Testing for selectivity bias in panel data models, *International Economic Review*, vol. 33, no. 3, 1992, pp. 681 - 703.
- No. 111 Th. Nijman and M. Verbeek, Nonresponse in panel data: The impact on estimates of a life cycle consumption function, *Journal of Applied Econometrics*, vol. 7, no. 3, 1992, pp. 243 - 257.
- No. 112 I. Bornze and E. van Damme, A dynamical characterization of evolutionarily stable states, *Annals of Operations Research*, vol. 37, 1992, pp. 229 - 244.
- No. 113 P.J. Deschamps, Expectations and intertemporal separability in an empirical model of consumption and investment under uncertainty, *Empirical Economics*, vol. 17, no. 3, 1992, pp. 419 - 450.
- No. 114 K. Kamiya and D. Talman, Simplicial algorithm for computing a core element in a balanced game, *Journal of the Operations Research*, vol. 34, no. 2, 1991, pp. 222 - 228.
- No. 115 G.W. Imbens, An efficient method of moments estimator for discrete choice models with choice-based sampling, *Econometrica*, vol. 60, no. 5, 1992, pp. 1187 -1214.
- No. 116 P. Borm, On perfectness concepts for bimatrix games, *OR Spektrum*, vol. 14, no. 1, 1992, pp. 33 - 42.
- No. 117 A.P. Jurg, I. Garcia Jurado and P.E.M. Borm, On modifications of the concepts of perfect and proper equilibria, *OR Spektrum*, vol. 14, no. 2, 1992, pp. 85 - 90.
- No. 118 P. Borm, H. Keiding, R.P. McLean, S. Oortwijn and S. Tijs, The compromise value for NTU-games, *International Journal of Game Theory*, vol. 21, no. 2, 1992, pp. 175 - 189.
- No. 119 M. Maschler, J.A.M. Potters and S.H. Tijs, The general nucleolus and the reduced game property, *International Journal of Game Theory*, vol. 21, no. 1, 1992, pp. 85 - 106.
- No. 120 K. Wärneryd, Communication, correlation and symmetry in bargaining, *Economics Letters*, vol. 39, no. 3, 1992, pp. 295 - 300.
- No. 121 M.R. Baye, D. Kovenock and C.G. de Vries, It takes two to tango: equilibria in a model of sales, *Games and Economic Behavior*, vol. 4, no. 4, 1992, pp. 493 - 510.
- No. 122 M. Verbeek, Pseudo panel data, in L. Mátyás and P. Sevestre (eds.), *The Econometrics of Panel Data*, Dordrecht: Kluwer Academic Publishers, 1992, pp. 303 - 315.
- No. 123 S. van Wijnbergen, Intertemporal speculation, shortages and the political economy of price reform, *The Economic Journal*, vol. 102, no. 415, 1992, pp. 1395 - 1406.
- No. 124 M. Verbeek and Th. Nijman, Incomplete panels and selection bias, in L. Mátyás and P. Sevestre (eds.), *The Econometrics of Panel Data*, Dordrecht: Kluwer Academic Publishers, 1992, pp. 262 - 302.

- No. 125 J.J. Sijben, Monetary policy in a game-theoretic framework, *Jahrbücher für Nationalökonomie und Statistik*, vol. 210, no. 3/4, 1992, pp. 233 - 253.
- No. 126 H.A.A. Verbon and M.J.M. Verhoeven, Decision making on pension schemes under rational expectations, *Journal of Economics*, vol. 56, no. 1, 1992, pp. 71 - 97.
- No. 127 L. Zou, Ownership structure and efficiency: An incentive mechanism approach, *Journal of Comparative Economics*, vol. 16, no. 3, 1993, pp. 399 - 431.
- No. 128 C. Fershtman and A. de Zeeuw, Capital accumulation and entry deterrence: A clarifying note, in G. Feichtinger (ed.), *Dynamic Economic Models and Optimal Control*, Amsterdam: Elsevier Science Publishers B.V. (North-Holland), 1992, pp. 281 - 296.
- No. 129 L. Bovenberg and C. Petersen, Public debt and pension policy, *Fiscal Studies*, vol. 13, no. 3, 1992, pp. 1 - 14.
- No. 130 R. Gradus and A. de Zeeuw, An employment game between government and firms, *Optimal Control Applications & Methods*, vol. 13, no. 1, 1992, pp. 55 - 71.
- No. 131 Th. Nijman and R. Beetsma, Empirical tests of a simple pricing model for sugar futures, *Annales d'Économie et de Statistique*, no. 24, 1991, pp. 121 - 131.
- No. 132 F. Groot, C. Withagen and A. de Zeeuw, Note on the open-loop Von Stackelberg equilibrium in the Cartel versus Fringe model, *The Economic Journal*, vol. 102, no. 415, 1992, pp. 1478 - 1484.
- No. 133 S. Eijffinger and N. Grijters, On the effectiveness of daily intervention by the Deutsche Bundesbank and the Federal Reserve System in the US dollar - deutsche mark exchange market, in Baltensperger/Sinn (eds), *Exchange-Rate Regimes and Currency Unions*, Basingstoke: The Macmillan Press Ltd., 1992, pp. 131 - 156.
- No. 135 A. K. Bera and S. Lee, Information matrix test, parameter heterogeneity and ARCH: a synthesis, *Review of Economic Studies*, 60, 1993, pp. 229 - 240.
- No. 136 H. G. Bloemen and A. Kapteyn, The joint estimation of a non-linear labour supply function and a wage equation using simulated response probabilities, *Annales d'Économie et de Statistique*, No. 29, 1993, pp. 175 - 205.
- No. 137 H. Bester, Bargaining versus price competition in markets with quality uncertainty, *The American Economic Review*, Vol. 83, No. 1, March 1993, pp. 278 - 288.
- No. 138 K. Wärneryd, Anarchy, uncertainty, and the emergence of property rights, *Economics and Politics*, Vol. 5, No. 1, March 1993, pp. 1 - 14.
- No. 139 A. L. Bovenberg and L.H. Goulder, Promoting investment under international capital mobility: an intertemporal general equilibrium analysis, *The Scandinavian Journal of Economics*, Vol. 95, No. 2, 1993, pp. 133 - 156.
- No. 140 S. Eijffinger and E. Schaling, Central bank independence in twelve industrial countries, *Banca Nazionale del Lavoro Quarterly Review*, No. 184, March 1993, pp. 49 - 89.

- No. 141 S. Eijffinger and A. van Rixtel, The Japanese financial system and monetary policy: a descriptive review, *Japan and the World Economy*, Vol. 4, No. 4, 1992, pp 291-309.
- No. 142 A. L. Bovenberg, Investment-promoting policies in open economies: the importance of intergenerational and international distributional effects, *Journal of Public Economics*, Vol. 51, 1993, North Holland, pp. 3-54 .
- No. 143 A. Özcam, G. Judge, A. Bera and T. Yancey, The risk properties of a pre-test estimator for Zellner's seemingly unrelated regression model, *Journal of Quantitative Economics*, Vol. 9, No. 1, January 1993, pp. 41-52.
- No. 144 F. C. Drost and T. E. Nijman, Temporal aggregation of garch processes, *Econometrica*, Vol. 61, No. 4, July 1993, pp. 909-927.
- No. 145 J. J. G. Lemmen and S.C.W. Eijffinger, The degree of financial integration in the European Community, *De Economist*, Vol. 141, No. 2, 1993, pp. 189-213.
- No. 146 R. Sarin and P. Wakker, A simple axiomatization of nonadditive expected utility, *Econometrica*, Vol. 60, No. 6, November 1992, pp. 1255-1272.
- No. 147 S. Muto, On licensing policies in bertrand competition, *Games and Economic Behaviour*, 5, 1993, pp. 257-267.
- No. 148 M. Verbeek and T. Nijman, Minimum MSE estimation of a regression model with fixed effects from a series of cross-sections, *Journal of Econometrics*, 59, 1993, pp. 125-136.
- No. 149 R. de Groof and M. van Tuijl, Financial integration and fiscal policy in interdependent two-sector economies with real and nominal wage rigidity, *European Journal of Political Economy*, Vol. 9, 1993, North Holland, pp. 209-232.

P.O. BOX 00150 5000 LE TILBURG THE NETHERLANDS

Bibliotheek K. U. Brabant

17 000 01138426 1