TOWARDS OPERATIONAL DISEQUILIBRIUM MACROECONOMICS

Towards Operational Disequilibrium Macro Economics

JAN C. SIEBRAND

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Preface

Most recent contributions to disequilibrium theory have a high level of abstraction. Empirical studies explicitly based on disequilibrium are still relatively scarce. However, empirical macro economics anticipated the theoretical development, and amalgamated classical and Keynesian elements often without a clear-cut formal base. Now a theoretical integration of neo-classical and neo-Keynesian economics seems under way. There is a renewed interest in the micro-economic foundations of macro economics with a special focus on the behaviour of economic agents operating in non-clearing markets. In some instances these theoretical developments offer an *ex post* justification for empirical macro-economic practices. Generally however, they call for new ways of empirical macro-economic model building.

This study operates on the border line between empirical macro economics and theoretical disequilibrium macro-economic theory. Our interest in macro-economic disequilibrium originates from the empirical side. Foreign trade relations for several countries revealed significant pressure of demand effects. Hence, the spillover of excess demand in domestic markets to foreign markets seemed a rather general phenomenon. This fact could be explained by a theory that states that actual demand for products from domestic firms will generally and systematically differ from the *ex ante* demand as suggested by equilibrium analysis. This latter demand concept comes close to Clower's 'notional demand' and Patinkin's 'potential demand'. Our first step in disequilibrium analysis was the construction of a model which determines this potential demand for domestic products as a function of potential imports and potential exports; the next was the development of an iterative estimation scheme for the empirical approximation of potential demand and its application to Dutch figures.

The idea that actual transactions could be conceived of as determined partly by neo-classical explanation schemes (based on items like prices) and partly by distribution devices such as rationing (often denoted as pressure effects) seemed general enough to try applications to other markets. The labour market held out a particular promise in this context. The analysis of wage-formation is generally based on disequilibrium schemes. Pressure effects are widely accepted in the analysis of short-term labour supply and furthermore there were signs that, for some periods in the sixties, actual employment in the Netherlands was suppressed

by labour scarcity.

Our effort to identify potential demand and potential supply in the Dutch labour market called for the development of a more general disequilibrium model, however, and a more general iterative approximation method. The model developed contains the conventional minimum model based on the so called principle of 'voluntary trade', i.e. with rigid prices actual transactions are equal to the minimum of demand and supply, as a special case. We argue that, as a rule, transactions are a compromise between the wishes of demanders and those of suppliers, more or less tending to the minimum. Technically this means that transactions are a weighted average of potential demand and potential supply, the weights of supply tending to zero in case of abundant excess supply (the Keynesian view of the thirties, applied to other economic conditions long after date) and transactions close to potential supply in periods of great excess demand (perhaps in a major part of the after war years, in which supply-oriented growth models became popular).

The application of ex ante/ex post analysis to partial models of product demand, and of demand and supply in the labour market, raises the question of their mutual integration. Our analysis of this question suggests that interpretable multi-market ex ante/ex post macro-economic models may be derived from rather conventional ex post models, under some simplifying assumptions. Theoretical feasibility of such ex ante/ex post models does not imply however that their implementation will be an easy task. In fact, the approximation to ex ante variables is generally a relatively complicated matter. Nevertheless, it seems worthwhile, as these models can contribute to the understanding of the behaviour of economic agents under the joint impact of equilibrium considerations and disequilibrium constraints. The further integration of short-term models and growth models, in particular, may benefit from ex ante/ex post analysis. To demonstrate this, we linked up with Hicks' theory of constrained cycles and built a two-market recursive dynamic model. In this model not only the labour-supply constraint, but also the availability of material production capacity — as a backbone of potential supply — together with potential demand for products and potential demand for labour, determine the transactions in both markets: production and employment.

In our view, the full scale empirical implementation of disequilibrium principles to macro-economic model building is not a matter of a few man-years; therefore, this book just gives some basic tools for a new approach with a few examples of their use. A large part of the hard work still remains to be done. We hope to have shown that the prospects for a gradual integration of the 'new macro economics' in macro-econometric model building are promising.

List of symbols

General

- 1) Lower-case letters stand for quantities in terms of constant prices or price variables.
- 2) Greek letters indicate coefficients.
- 3) Letters without a small o denote levels of variables.
- 4) Letters with a small o denote (annual) percentage changes of variables ($\overset{o}{x} = 100 \cdot \frac{x_t - x_{t-1}}{x_{t-1}}$).
- 5) The use of the symbol Δ preceding a variable indicates a first difference operation applied to that variable $\Delta x_t = x_t - x_{t-1}$.
- 6) Letters with a bar ($\bar{}$) denote average values; $\bar{\overset{o}{x}}$ denotes the average value of $\overset{o}{x}$, $\bar{x}$ denotes the average value of x .
- 7) Variables for the current year do not have a numerical suffix. They may or may not have the suffix t .
A lag of 1, 2, ..., n periods is indicated by either $-1, -2, \dots, -n$ or $t-1, t-2, \dots, t-n$.
A lead of 1, 2, ..., n periods is indicated by either $1, 2, \dots, n$ or $t+1, t+2, \dots, t+n$.
The suffix t_{4321} denotes a specific lag structure:
 $x_{t_{4321}} = 0.4 x_t + 0.3 x_{t-1} + 0.2 x_{t-2} + 0.1 x_{t-3}$.
The suffix 0 refers to a base year, the suffix 60 to 1960 etc.
- 8) The suffix au denotes an autonomous component of the variable under consideration.
The suffixes d and s are used to indicate *ex ante* demand and *ex ante* supply

variables respectively, or, in the case of prices, anticipations of potential buyers and potential sellers respectively.

The suffixes de and se refer to effective demand and effective supply respectively.

The corresponding variables without a suffix indicate the (ex post) realizations. Where needed, ex ante variables are also labeled with an upper index p ('potential') to differentiate between ex ante variables without a clear-cut demand or supply nature and ex post variables. In Chapter 6 this upper index is combined with a second letter b ('business'), p ('private households') or w ('world'), to indicate anticipations of different agents.

- 9) As a consequence of their hypothetical character, the definitions of ex ante variables in this list are only rough, as the accurate meaning of these variables can only be defined in the context (model) in which they are used.
- 10) Labour-market variables referring to numbers of persons are denoted with the basic symbol 'a', variables based on 'constant-working-hours-man-years' with the basic symbol 'l'. These variables can coincide if no changes in working hours are assumed.

Specific

a_a	dependent labour force
a_b	employment in industry
a_{b_d}	potential labour demand in industry
$a_{b_{se}}$	effective labour supply for industry
a_c	total actual labour demand (industry and government)
a_d	potential total labour demand (industry and government)
a_g	government employment
Δa_m	net foreign migration of (potential) workers
a_n	capacity employment, including the impact of normal contractual working hours
a_p	number of frontier workers
a_s	total potential labour supply (industry and government)
a_{se}	total effective labour supply (industry and government)
a_y	dependent labour force corrected for frontier workers
a_{y_s}	dependent potential labour supply corrected for frontier workers
a_z	self-employed labour force
b	exports of goods and services
b_d	export demand (goods and services)
b_g	exports of goods
b_{g_d}	potential exports of goods
c	consumption

c_a	part of consumption planned ex ante
cap	production capacity
c_b	basic consumption
c_d	consumption demand
c_r	part of consumption fixed ex post
d_i	determinant i of potential demand
F	labour share in total income of industry
g	working-age population
g_x	working-age population corrected for external migrants
h_c	index number of contractual working hours per man per year
i	investment
i^*	auxiliary variable investment determination
i_a	investment demand as determined by a curvilinear accelerator function
i_d	investment demand
i_l	investment demand as determined by a linear accelerator function
i_n	net investment
k	capital stock
l	employment (quantity of labour expressed in man-years based on a constant number of working hours per man per year)
L	wage income
l_b	potential labour demand, including liquidity effect
l_d	labour demand
Δl_e	change in capacity employment due to economic obsolescence
l_n	capacity employment (at normal utilization rate)
l_q	liquidity ratio of industry
l_s	labour supply
l_{se}	effective labour supply
m	imports of goods and services
m_d	import demand (goods and services)
m^*	age of the oldest vintage of capital goods
m_g	imports of goods
m_{gd}	potential imports of goods
m_w	world imports (weighted according to export shares)
nb_a	net inventory formation expressed as a percentage of sales, in deviation of the average value of this percentage
n_i	total number of social groups, relevant for labour supply
n_D	number of demand determinants
n_S	number of supply determinants
ob	overtime index
p	price
P	prediction
p_b	export price
p'_b	price of competing exports
p_c	consumption price
p_d	price anticipated by potential buyers

p_l	wage rate (per man-year)
p/b	wage rate per worker
p_m	import price
p_s	price anticipated by potential sellers
p_v	price of sales
p_y	price industrial production
q	relative excess production capacity
q_a	relative excess production capacity, measured in deviation from its average value
r	participation rate
R	realization
r^*	domestic participation rate apart from demographic factors
r_i	participation rate of social group i
r_s^*	upper limit of participation rate (saturation level)
s	scrapping
s_j	determinant j of potential supply
$t(T)$	time
u	weight generally used to indicate the relative importance of the anticipations of potential sellers; the specific meaning of individual u 's is explained by the context
v	sales
v_n	domestic sales plus net exports of services
v_{nd}	potential domestic sales plus net exports of services
w	unemployment rate
w_P	potential unemployment rate
x	transactions
x_d	potential demand
x_{de}	effective demand
x_s	potential supply
x_{se}	effective supply
y	industrial production
Y	value industrial production (income)
y_d	potential demand for products
y_{ed}	excess demand for products as a percentage of actual industrial production
y_i	component i of y
y_{id}	component i of y_d
y_{is}	component i of y_s
y_{la}	agricultural production in deviation from its trend
y_n	net production
y_{nd}	net demand for products
y_{nsk}	net material production capacity
$y_{ns/l}$	net product supply as conditioned by labour availability
y_p	real family income
y_s	potential supply of products

y_{sc}	intended short-time supply of products (exclusive of the impact of the availability of labour and liquidities)
y_{sh}	production at normal operating rates given contractual working hours of labour
y_{sk}	potential supply of products based on capital availability
y_{sl}	intended short-term supply of products including the impact of the availability of labour and liquidities
z	real nonwage income
Z	nonwage income
z/y	real share of nonwage income

SD	standard error of the regression
R^2	coefficient of determination
DW	Durbin-Watson ratio