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THE DISEQUILIBRIUM THEORY: R. PORTES VS. J. KORNAI
- A CRITICAL COMPARISON

1. Introduction

The disequilibrium theory is a branch of macroeconomics, which deals with the economy in which a general market equilibrium is attained by means other than price adjustment. In literature two concepts of the disequilibrium theory which characterizes the centrally planned economy prevail. First, derives from macroeconomic theory of the market economy; second, from microeconomic analysis of the centrally planned economy. First concept was formulated by R. Portes. The concept was based on theoretical foundations of the market economy disequilibrium theory which were laid down by R. Barro, H. J. Grossman, as well as by E. Malinvaud and others. Different concept was created by Hungarian critic of the western disequilibrium theory - J. Kornai. The purpose of the paper is to show differences and similarities between the two approaches to characterize the centrally planned economy. For this purpose, the models origins, assumptions as well as complete models with the adjustment mechanisms and reference points of regulation will be presented.

In the centrally planned economy prices do not adjust to balance supply and demand. Therefore, the desequilibrium theory provides better theoretical framework to analyse the centrally planned economy than the neoclassical theory of the market eco-

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nomy. By pointing out reproducible regularities, the disequili-
brium theory makes construction of econometric models as well as
their application by planners feasible. In order to use one ap-
proach, rejecting the other, their critical comparison has to
be made.

Before presenting the origins of the desequilibrium theory a
few words about terminology which is not consistent. How to de-
fine the model, in which markets do not clear? Models in which
markets do not clear are often called "disequilibrium" models,
but both Portes and Kornai agree, that this usage is misleading.
According to Portes (see R. P o r t e s (1980), p. 341) ana-
lysis is concerned with the sequence of short periods. Within
each period, although markets do not clear, he assumes agents
have adjusted their behavior in the light of perceived price and
quantity signals, so that their actions are mutually consistent.
It makes perfectly good sense to call the resulting state of rest,
a short period equilibrium with rationing; where only quantity
changes, while prices and wages remain unchanged. Kornai, on the
other hand, points out to long term character of deviations of
the centrally planned economy from Walrasian equilibrium. Perma-
nent character of imbalance between supply and demand suggests,
that the state is typical, and, in this sense, is a state of
equilibrium. An equilibrium in classical Machlup's definition
takes place when a set of interrelated variables is so adjusted,
that it does not show inherent tendency to change (V. D l o u h y
(1985), p. 5). The state of rest is typical; the model can be
thrown out of it by exogeneous interference only.

Although inproper, the term "disequilibrium theory" has found
its place in the vocabulary. Thus, in the paper, it will be used
alternately with the term "short period equilibrium theory with
rationing".

2. Portes Model

2.1. Origins

Disequilibrium theory of the market economy was created as a
result of criticism of generally accepted macroeconomic theory
based on Walrasian model. R. J. B a r r o and H. J. G r o s-

s m a n (1976), (p. 38) point out that first, the explanation
how equilibrium prices are set is unrealistic, and second, Wal-
rasian model does not account for such phenomena as long-term
deviations from equilibrium like the involuntary unemployment and
the shortages of repressed inflation. Since the centrally planned
economies also suffer from sustained imbalance between supply and
demand, the principles of disequilibrium theory have been applied
by Portes to interpret their behavior.

The critics of Walrasian model amounts to the critics of the
way market-clearing prices are set, which is considered to be
unrealistic. The mechanism which guaranteed that the exchange took
place under market-clearing conditions was the recontracting me-
chanism assumed by Edgeworth, as a part of Walras' "tâtonnement"
groping process (R. J. B a r r o, H. J. G r o s s m a n
(1976), p. 30). At each market, price setting agents through a
trial-and-error process search for prices that will balance the
quantities supplied and demanded. Recontracting means that a
transaction completed at a price different from market-clearing
figure, eventually set by price-setting agents, has to be comple-
ted again at market-clearing price, or cancelled (R. J. B a r r o,
H. J. G r o s s m a n (1976), p. 31). In practice, price-set-
ting mechanism requires highly efficient, centralized information
system, so that numerous exchange participants can present their
price-volume preferences to the auctioneer. But no evidence con-
firms the existence of such a system. Nor does the recontracting
mechanism properly characterize the markets, in which offers to
buy or sell are binding. Therefore, the auctioneer-recontracting
model, historically associated with Walras and Edgeworth, has to
be rejected as not fitting to reality.

Alternative rationalization for the existence of equilibrium
prices is the Marshall's model. Marshall assumes, that perfect-
ly flexible prices adjust supply and demand in a case of momen-
tary discrepancies between those quantities. Empirical data,
however, do not confirm the existence of perfectly flexible pri-
ces. On the contrary, they suggest that short-term price ad-
justments are less apparent and less influential than short-term
quantitative adjustments (E. M a l i n v a u d (1977), p. 10).

Therefore, even in the short run, quantitative adjustments de-
termine the quantity traded on the markets.

Another phenomena undermining the validity of the Walrasian
and the Marshalian models are the phenomena of the unvoluntary
unemployment of depressions, or the shortages which characterize
suppresed inflations. The phenomena are not explained by the mo-
dels (R. J. B a r r o, H. J. G r o s s m a n (1976), p. 39).
When analysing the demand for labor, Patinkin notices that   in
the case of excess supply of consumer goods, which means that
firms cannot sell all they produce, their demand for labor falls
The crucial conclusion is that when one market is in   disequ-
ilibrium, imbalance is transmitted to the other market (R.
P o r t e s (1980), p. 338).

When market is in disequilibrium, then either some buyers,
or some sellers are able to carry out only part of their inten-
ded transactions. The constraint on the quantity traded   will
affect their demand and supply in the other market. In this way,
without price changes, quantity signals will be transmitted   to
other markets. To illustrate, when unemployment coincides   with
excess supply of consumer goods, unemployment means lower con-
sumer demand, which in turn discourages firms from expanding pro-
duction through employing additional workers. The existence   of
quantity signals in the absence of price signals suggets infor-
mational failures of prices as messenger carrier organizing the
market. The persistence of involuntary unemployment and repres-
sed inflation suggest the sustained existence of prices which do
not clear the market.

2.2. Assumptions of Portes Model

If transactions take place at prices which do not clear the
market, then either some buyers, or some sellers, will be unable
to trade what they wish at prevailing prices; so they are "ra-
tioned". Demand and supply for each market can be either natio-
nal (unrationated), when they depend only upon endowements and
prices, or rationed (quantity-constrained), when they depend on
quantity restrictions on other markets as well. For example, the

worker's demand for consumption goods depends on restrictions on labor market. If he can work full time, his demand for consumption goods will be notional unrationed. His demand depends on realized income and the price level. His income is, by definition, equal to his potential income, that is a maximum he can get with his skills, physiological abilities and prevailing work time. If he can work part time only, he will be rationed in his employment. Since his income will be short of potential, his demand for consumption goods will be smaller as well; it will be rationed. To recapitualate, effective demand and supply on the given market can be either notional, or rationed, when quantity rations are experienced on other markets. The quantity traded equals smaller quantity from the effective demand and supply. The "minimum condition" concerning the quantity traded holds under the assumptions that exchange is voluntary, as well as that the total quantity sold must equal the total quantity purchased. The third property of an equilibrium with rationing is that there cannot be simultaneously rationed buyers and sellers on the same market (R. P o r t e s (1980), p. 345).

2.3. Foundations of the Portes´ Model

In his model of the centrally-planned economy, R. P o r t e s (1981) considers two markets; the consumption goods market and the labor market. There are three commodities: money, goods and labor. Prices of goods and wages are fixed for the period and agents take the quantity rations they face during the period as exogeneous. Two economic agents are included: households and the state sector, identified with central planners. Both households and central planners try to maximize their utilizy function within two periods under consideration: the current and the future.

Households supply labor, demand goods and money balances. They maximize the utility function, which arguments are: consumption, leisure time and money balances. Since exchange is voluntary, they are free in their decisions to sell labor and buy goods.,

Planners, understood as the Centre, control the state pro-
ductive sector, which consists of state enterprises, central bank
and the budgetary authority. Planners demand labor from and sup-
ply consumption goods to households, hold inventory and use part
of final output as government expenditures (investment, defence,
public consumption). They maximize utilizy function which argu-
ments are consumption and government expenditures, subject to se-
veral constraints. The constraints are: an aggregate balance e-
quations (output equals end-use); equations relating sales of
consumption goods and labor services to households' demand and
supply; a production function; and an inventory holding function,
relating desired inventories to output (R. P o r t e s (1981),
p. 10). When constructing the plan for the future period, plan-
ners take into account the errors in the assumptions for the last
period's plan. The assumptions concerns: fixed productive ca-
pital, inventory and money balances levels at the end of the pe-
riod, which depend on the supply-and-demand relation during the
period. In the long run, planning and planners reactions to signs
of disequilibrium play a role of the equilibrium mechanism (R.
P o r t e s (1981), p. 6).

The aggregate balance equation for goods does not require
that the planners seek the supply-and-demand balance in indivi-
dual markets, specifically in the consumption goods market.
Thus, theoretically they can construct two types of plan: "ba-
lanced" and "unbalanced". In the former, the planners do seek
zero excess demand in the consumption goods market, what allows
to assume that the labor supply will be unconstrained. In the
latter, the planners choice of the wage rate and of consumption
goods supply will cause the labor supply to be constrained. Ac-
cording to R. P o r t e s (1981), (p. 11), some data suggest that
planners from centrally planned economy countries constructed the
unbalanced plan on purpose.

2.4. The Models Equations

The two-market short period equilibrium model with rationing
consists of eight equations. The equations describe supply and
demand functions on both markets, the minimum condition, as well

as production function and inventory holding function. I use the following notation:

c^d, $\bar{c}^d$ — unconstrained and constrained demand for consumption goods,

c^s — notional supply of consumption goods,

c — consumption,

1^s, I^s — unconstrained and constrained supply of labor,

1^d — labor demand,

1 — employment level,

w^p — nominal wage rate,

m_o — households money balances at the beginning of the period,

i_o — consumption goods inventories at the beginning of the period,

y — production level,

g^p — government expenditures on consumption goods market,

k — stock of fixed productive capital,

m_o^e, i_o^e — expected money balances and inventory level at the beginning of the current period. Besides the given under the equations, the following signs of partial derivatives are assumed:

$$\partial w^p / \partial m_o^e < 0, \qquad \partial w^p / \partial i_o^e > 0, \qquad 0 < \partial c / \partial y < 1 \qquad \text{(R. P o r-}$$

$$\text{t e s (1979), p. 14) (1)}$$

On the consumption goods market:

$$c^d = \begin{cases} c^d(w^p_{(+)}, m_{o\,(\mp)}) & \text{when} \qquad 1^d > 1^s = 1 \qquad (2a) \\[2mm] \bar{c}^d(w^p_{(+)}, m_{o\,(\mp)}, y_{(+)}) & \text{when} \qquad 1 = 1^d < 1^s \qquad (2b) \end{cases}$$

$$c^s = c^s(y_{(+)}, m_{o\,(-)}, i_{o\,(\mp)}) \tag{3}$$

$$c = \min(c^d, c^s) \tag{4}$$

Effective demand for consumtion goods is given by unconstrained function, when no quantity constraints are actually encountered on labor market. Demand for consumption goods is constrained, when labor supply is rationed. In the latter case, consumer demand depends on wage rate set by planners and therefore planned, level of money balances at the begining of the period as well as on production level, which directly affects employment level. Consumer goods supply is directly proportional to production and inventory level. Consumption equals smaller quantity from effective demand and supply.

On labor market:

$$l^d = l^p \tag{5}$$

$$
l^s =
\begin{cases}
l^s(\underset{(+)}{w^p}, \underset{(-)}{m_0}) & \text{when} \quad c^s > c^d = c & (6a) \\[2ex]
l^s(\underset{(+)}{w^p}, \underset{(0)}{m_0}, \underset{(+)}{c}) & \text{when} \quad c = c^s < c^d & (6b)
\end{cases}
$$

$$l = \min(l^d, l^s) \tag{7}$$

Labor demand equals to planned by planners. Effective labor supply is given by the unconstrained function, if no excess consumer demand exists. Effective labor supply is given by the constrained function, when consumption goods market will be in excess demand. Employment equals smaller from effective demand and supply.

Production function and inventory level:

$$y = y(\underset{(+)}{l}, \underset{(+)}{k_0}) \tag{8}$$

$$i = i_0 + y - c - g^p \tag{9}$$

In the next equation, production is a function of employment and fixed productive capital. In the last equation, inventory level during the current period depends on its level at the beginning

of the period, production was well as consumption and planned government expenditures. It is assumed that government is never rationed (R. P o r t e s (1980), p. 342).

Combination of equations (2) - (6) shows, that for combined consumption and labor markets four various constraint régimes arre possible:

a) when conditions (6b) and (2a) are met; $c^d > c^s$, $1^d > 1^s$, equations (2) - (9) take form:

$$c = c^s(y, m_0, i_0), \quad 1 = \bar{1}^s(w^p, m_0, c), \quad y = y(1, k_0), \quad i = i_0 + y - c^s -$$
$$\quad (+) (-) (+) \qquad\qquad (+) (-) (+) \qquad\qquad (+) (+)$$
$$- g^p \tag{10}$$

excess demand in the goods market and no excess supply in the labor market is called the repressed inflation;

b) when conditions (6a) and (2a) are met; $c^d < c^s$ and $1^d > 1^s$, equations (2)-(9) have form:

$$c = c^d(w^p, m_0), \quad 1 = 1^s(w^p, m_0), \quad y = y(1, k_0), \quad i = i_0 + y - c^d - g^p$$
$$\quad (+) (+^0) \qquad\qquad (+) (-^0) \qquad\qquad (+)(+) \tag{11}$$

excess supply in the goods market combined with excess demand in the labor market is called underconsumption;

c) when conditions (6b) and (2b) are met; $c^d > c^s$, $1^d < 1^s$, the equation (2)-(9) take form:

$$c = c^s(y, m_0, i_0), \quad 1 = 1^p, \quad y = y(1, k_0), \quad i = i_0 + y - c^s - g^p \tag{12}$$
$$\quad (+) (-)(+) \qquad\qquad\qquad (+)(+)$$

shortage on the consumer goods market along with excess supply of labor, i.e. unemployment, represent classical unemployment of the market economy;

d) when condition (6a) and (2b) are met; $c^d < c^s$ and $1^d < 1^s$ equations (2)-(9) take shape:

$$c = \bar{c}^d(w^p, m_0, y), \quad 1 = 1^p, \quad y = y(1, k_0), \quad i = i_0 + y - c^d - g^p \tag{13}$$
$$\quad (+) (+)(+) \qquad\qquad (+)(+)$$

excess supply on both the goods and the labor markets,   reflect
the state of Keynesian unemployment (R. P o r t e s (1981), p.
20).

According to R. P o r t e s (1981), (p. 21), the centrally plan-
ned economy is best described by the first régime of excess de-
mand on both markets, the régime known as repressed inflation. The
most likely alternative for repressed inflation is régime (b).
Excess demand for labor is not followed by shortage on the good
market, which planners managed to avoid. Régime (c) seems to cha-
racterize properly the situation in the 1950's, when excess sup-
ply of labor (hidden unemployment in agriculture) followed excess
demand for consumer goods. Shortage of consumer goods resulted
from holding consumption down, in order to accelerate industria-
lization by rising accumulation and investment rates. Régime (d),
which there is excess supply on both markets is an unlikely case.

Assuming the above-listed signs of partial derivatives, we
receive the model with a feedback. A feedback between the plan
implementation in the current period and its assumptions for the
next period, through planners reactions to deviations of imple-
mentation from the planned values. It is assumed that planners
control directly the wage rate, the demand for labor, government
expenditures and the supply of consumption goods. They   control
other variables indirectly (R. P o r t e s (1981), p. 16).

2.5. The Model's Behavior

Régime of repressed inflation as being the best approximation
of the centrally planned economy in the 80's will be analyzed in
detail. Régime is described by the equation (10). How, in régime
of repressed inflation, does the model react to changes of va-
riables directly controlled by planners? I will examine the im-
pact of change in government expenditures and in the wage rate
on general market equilibrium. An increase in government expen-
ditures, holding other variables in the inventory holding equa-
tion unchanged, reduces the inventory level at the beginning of
the next period to the level below the level at the beginning of
the current period. Smaller inventories prompt cut in consumption

goods supply and consequently reduce labor supply. As a result, supply of consumption goods will go down further, due to overall production decline. This means that an increase in government expenditures exacerbates the consumption goods market disequilibrium and causes consumption goods production to decline.

What effect on market equilibrium will have a wage rate rise? The wage rate rise should increase shorter arm of labor market, that is labor supply. But in the case of excess demand in the consumption goods market, the wage rate increase will result in an increment of households money balances, which will have just the opposite effect on employment. Let's notice, however, that if households are convinced to accumulate money balances to spend them at some future date, the wage rate raise will indeed contribute to increased employment and consequently to an increased supply of consumption goods as well. This option allows output increase without consumption increment through the wage rate raise. The option does not exist indefinitely, because after households become satisfied with money balances, once they surpass certain level, households will reduce labor supply to the level consistent with the consumption level (R. P o r t e s (1981), p. 15). The conclusion of the analysis is that the government expenditures increase and the wage rate raise in régime of repressed inflation produces effects opposite to expected. Instead of to increase, they tend to reduce consumption supply through their effects on labor supply.

Do the above conclusions imply that planners are powerless and unable to manage the economy described by the model? Absolutely not. For example, an unexpected increase in consumption demand in the current period increases excess demand and through its effects on i^e and m^e tends to reduce w^p and l^p for the following period and hence c^d (R. P o r t e s (1981), p. 22).

In this way, without a price change, a period-to-period feedback from transactions in the goods market to the wage rate and demand for labor is attained. It operates in a direction opposite to the feedback in the Keynesian model of a market economy. In Portes' model, both kind of assets, money balances and inventory, carry into the future the effects of the current events. The mechanism equilibrating the system in which market prices do not

adjust to excess demand, are planners reactions to deviation of
realized outcomes from the planned figures (R. P o r t e s (1981),
p. 22).

2.6. An Attempt to Apply Barro-Grossman Conclusion
to Portes´ Model

The above analysis arises the question what set of   actions
will improve the situation, that is, increase labor supply   and
reduce excess consumption demand in the case of repressed infla-
tion? Let´s attempt to apply to Portes´   model the conclusion of
Barro-Grossman analysis of market economy deviations from   the
Walrasian equilibrium. Their analysis included two crucial obser-
vations. First, real wage rate, which is consistent with   gene-
ral-market-clearing, may also be associated with excess demand,
if the price level is below general-market-clearing level.   Se-
condly, too low a price level and the consequent excess demand
for goods cause employment and production output to be below full
employment levels (R. J.   B a r r o, H. J. G r o s s m a n (1976),
p. 85). Labor supply is below notional,   because households are
constrained in their consumption.

On the basis of the above observations, they conclude   that
a rise of the real wage rate is not required to restore full em-
ployment. Employment can be increased through and equiproportio-
nate rise in the price level and nominal wage rate, or   through
a contractionary government action - for example, some   combina-
tion of an increase in taxes and a decrease in the stock of mo-
ney balances (R. J. B a r r o, H. J. G r o s s m a n (1976),
p. 85).

In Portes´ model of the centrally planned economy, an ancrease
in the nominal wage rate expends consumption goods demand   and
labor supply. Simultaneously, a rise in the price level   causes
the real stock of money balances to decline. A decrease in money
balances increases labor supply. A decrease in money balances will
also reduce demand for consumer goods, which is a function   of
wealth, represented among others by the stock of money balances.
In this way, the equiproportionate rise in the price level   and
nominal wage rate, increases labor supply to its nominal   level

and, consequently, employment as well as production, while re-
ducing consumer demand. In the case of convergent changes on
both sides of the consumption market, reaching the general market
equilibrium depends only on the magnitude of initiating stimulus,
that is on the scale of the rise in the price level and in no-
minal wage rate.

2.7. Summing Up of the Model

Macroeconomic model of the centrally planned economy construc-
ted by R. P o r t e s (1979, 1981) through a period-to-period
price and wage change provides an alternative to repressed in-
flation. Portes' model is an application of the short period equi-
librium theory with rationing of the market economy. The the-
ory, worked out by R. Barro, H. J. Grossman as well as by E.
Malinvaud and others, was used by R. Portes to model the cen-
trally planned economy. The theoretical foundations cause making
certain assumptions, which are tacitly included in the model. The
assumptions deal with close relationship between wage rate and
labor supply as well as between employment and production. The
acceptance of the assumptions cause that Portes' model may differ
from the reality of the centrally planned economies.

The model contains the equilibrating mechanism in a form of
planners reaction to deviation of realized values from planned
ones. The reference point of regulation are planned figures. No-
tice, that in the unbalanced plan, labor supply is constrained
rationed, that is by definition smaller than when consumption
market is in equilibrium. Labor supply grows to notional unra-
tioned level when, due to equiproportional nominal wage rate and
price level increase, planned values reflect general market clea-
ring figures. Consequently, the basic advantage of the model
is to show the way out from chronic excess demand. The proposed
solution is worth considering for two reasons. First, it calls
for price changes, which in the centrally planned economies are
used as equilibrating mechanism very rarely. Second, because in-
troduced paralelly to nominal wage rate raise, the price level
increase does not reduce real wages, which the price hikes ge-
nerally coincide with.

3. Kornai's Model

3.1. The Origins of the Model

The key thesis of Kornai's disequilibrium model is the hypo-
thesis, that the prime reason for shortage in the economy and the
manner the centrally planned economy functions are its institu-
tional solutions (J. K o r n a i (1985), p. 628). Planning in
the form of planning bargainning between the central planner and
the state enterprise, brings the phenomena like 'plan stretching',
costs and prices manipulation, which lead to soft-budget const-
raint of the state sector. Soft-budget constraint means that the
level of firm's revenues does not depend on its resources utili-
zation. Soft-budget constraint leads to the excessive demand from
the state sector, which creates shortages (J. K o r n a i (1984),
p. 431). Institutional solutions are also responsible for perma-
nent reproduction of shortages (J. K o r n a i (1982), p. 90).

Since institutional solutions of the planned economy deter-
mine the way if functions, short-period equilibrium models with
rationing presented by western authors, do not properly describe
the economy (J. K o r n a i (1982), p. 91). Kornai's criticism
concerns the following problems: the use of the minimum condi-
tion, the adoption of the aggregated excess demand and changes in
savings as shortage intensity indicators, the description of the
planned economy as suffering from repressed inflation as well as
the characteristics of labor supply.

J. K o r n a i (1982), (p. 34) rejects the minimum condi-
tion, which says that the actual purchases and sales equal to
smaller figure from effective demand and supply. Because of for-
ced substitution, demand for substitute goods is larger than or-
iginal. As shortage spills over to other markets due to forced
substitution, in the macro scale, simultaneously slack and shor-
tage exist. Consequently, excess demand and excess supply on dif-
ferent markets cancel out and thus underestimate the real magni-
tude of shortage. The aggregated excess demand indicator, there-
fore, is an incorrect measure of shortage intensity. More closer
analysis requires also changes in households savings. Increased
savings can result from new opportunities to buy durable goods

and not from deteriorated market situation. Savings growth, the-
refore, cannot be a shortage intensity indicator.

Better shortage intensity indicator than the aggregated excess
demand and savings increment is the disaggregated vector of part-
ial indicators (J. K o r n a i (1985), p. 627). Partial short-
age indicators are, for example; the delivery time for cars, wage
changes instead of price changes as a substitute for excess de-
mand (V. D l o u h y (1984), p. 20), the discrepancy between
planned and realized value (W. C h a r e m z a, M.   G r o n i -
c k i (1985), p. 24).

Completely wrong, according to Kornai, is to   characterize
the centrally planned economy as the repressed inflation. First
of all, shortage results not from insufficient labor supply and
production, but from firms` pressure. Secondly, "semi-monetarized
economy, in which prices and money do not genuinely influence the
macrovariables of production, investment and employment   cannot
be properly described in terms of its money being stable or in-
flated, or price increases being repressed or permitted"   (J.
K o r n a i, (1982), p. 91).

Basically wrong are also western deliberations about   labor
supply. First, labor supply is not inversely proportional to
shortage intensity. If a direct correlation between the variables
exists, it must be a positive one. Increased shortage intensity
forces many people to work overtime to afford buying for   addi-
tionally increased black-market prices consumption goods which
are in high demand (J. K o r n a i (1985), p. 629). Second, la-
bor supply is not given as a simple division of time   between
work time and leisure time. As it is widely accepted in macroe-
conomic theory of market economy, the division is based on the
scope of displeasure and the magnitude of benefit, that is the
wage rate, connected with devoting some time to work. On the size
of labor supply substantial impact have other factors as well.
Those factors are: the need to find a permanent source of income
(concerns workers during the period of absorbing labor reserves),
opportunity of social advancement as well as availability of or-
ganized child care (concerns women) and working habits,   which
reduce wage elasticity of labor supply (J. K o r n a i (1985),
p. 629).

Rejecting assumptions of western short period equilibrium
theory Kornai formulates his own, which take into account the
specifics of the centrally planned economy. He uses them to build
his own model. Before presenting his model, I will briefly cha-
racterize the most crucial notion of the model - the notion of
shortage intensity.

3.2. Shortage Intensity

In his criticism of western disequilibrium theory, Kornai de-
fines shortage régime as a typical state of the centrally plan-
ned economy. Chronic shortage suggests the notion of normal shor-
tage intensity (J. K o r n a i (1982), p. 20). Normal shortage
intensity is measured by the vector of partial shortage intensity
indicators.

Actual shortage intensity z_t fluctuates around normal shor-
tage intensity z_t^*, which is constant for a given institutional
framework. Using the notations listed on page 20, actual short-
age intensity is given by the equation (14):

$$z^t = z_t^* + \gamma_n(n_t - n_t^*) - \gamma_u(u_t - u_t^*) - \gamma_v(v_t - v_t^*) +$$
$$+ \gamma_z(z_{t-1} - z_{t-1}^*) + \gamma_1(1_t^d - 1_t^s) \tag{14}$$

The factor which corrects actual shortage intensity is the
impact of deviations of variables determining the structural e-
quilibrium from their normal values. The variables are: in-
vestment commitment, output and input stock, as well as shortage
intensity in the previous period and, in the case of exhausted
labor reserves, shortage of labor force.

Shortage intensity is the basic independent variable of the
economic growth model of the centrally planned economy constru-
cted by Kornai. In the model, shortage intensty determines basic
variables, which characterize, in gis opinion, the planned eco-
nomy. The variables are: input and output stock, current product-
ion, firms' and households' purchases as well as volume of the in-
vestment vintage (J. K o r n a i (1982), p. 66).

3.3. Equations and Assumptions of Kornai's Model

Macroeconomic growth model of the planned economy consists of 26 equations. The compressed model contains 6 equations. The model is divided into two spheres: the real sphere and the control sphere; so are the variables (J. K o r n a i (1982), p. 75). In the model's equations the following notations are used:

a   - current input;
b   - investment input;
c   - household purchases, i.e. consumption;
l^d, l^s - demand and supply of labor;
m   - volume of the investment vintage;
n   - investment commitment;
u   - output stock;
v   - input stock;
x   - firms' purchases;
y   - production;
z   - shortage (the macroindex of shortage).

The asterisk denotes the normal value of the variable, which corresponds to normal shortage intensity. A superscript t denotes the number of the time interval under consideration. Coefficients δ_n, δ_u, η_v, x_z, δ_l, μ_c, express strength of the reaction of the dependent variable to deviation of the given independent variable from its normal value.

The real sphere variables are: shortage intensity, output and input stock. The remaining equations of the real sphere have the from:

$$u_t = u_{t-1} + y_{t-1} - x_{t-1} - c_{t-1} \tag{15}$$

$$v_t = v_{t-1} + x_{t-1} - a_{t-1} - b_{t-1} \tag{16}$$

The basic three equations of the control sphere, describing the volume of the investment vintage, firms' and households purchases have the form:

$$m_t - m_t^* = \mu_c(c_{t-1} - c_{plan(t-1)}) - \mu_n(n_t - n_t^*) -$$

$$\mu_z(z_t - z_t^*) \tag{17}$$

$$x_t - x_t^* = - \eta_v (v_t - v_t^*) - \eta_z (z_t - z_t^*) \tag{18}$$

$$c_t - c_t^* = \chi_z (z_t - z_t^*) \tag{19}$$

The model is stable and controllable. Stable, because it moves along a certain path. Controllable, because after the system departs from the normal path, a suitable choice of control variables can bring it back to the normal path within a finite period.

The model incorporates a feedback; it generates signals which "feed back" into the system and influence its subsequent development. Therefore, it is a growth model with endogeneous control of the real sphere (J. K o r n a i (1982), p. 77). The control is done by norms - variables' values unchanged over a time period. The goal of the control mechanism is to bring variables back to normal values, that is to norms.

The economy described by the model moves along a normal path and is stable, therefore the state is permanent, i.e. it is a non-Walrasian long-term equilibrium. For (J. K o r n a i (1982), (p. 89), a normal path and a non-Walrasian long-term equilibrium are synonyms. The normal path, determined by normal shortage intensity on consumption and labor markets, is an analogous notion to Keynesian unemployment equilibrium. Non-Walrasian properties of the presented model are: constant reproduction of shortage and non-Walrasian signal system. The signals are non--price signals; quantitative changes of control variables (J. K o r n a i (1982), p. 91).

3.4. Analysis of Model's Behavior

When analyzing the model, Kornai investigates the effect of shortage on efficiency of consumption and production. Reducing consumption efficiency, shortage has a clear-cut negative impact on consumption. Difficulty with good's purchase, which accompanies shortage on the consumption market reduces consumer's satisfaction and causes different consumption allocation than it would result from income distribution (J. K o r n a i (1982), p. 95).

On the contrary to clearly negative impact of shortage   on
consumption efficiency, its impact on production efficiency is
more diversified. In a case of resources already drawn into pro-
duction process, shortage causes inefficient use of labor res-
ources, raw materials and investment inputs. Short-term effects
of shortage include: production interruptions, forced substitu-
tion of resources or of production structure, lowered work dis-
cipline, as well as quantity drive, i.e. the tendency to maximize
the quantity production of without paying attention to quality
and costs. Long-term effects of shortage are widely known pheno-
mena which coincide with sellers market, that is high production
costs and lack of motivation to introduce technological progress
(J. K o r n a i (1982), p. 97).

Besides those wiedly accepted, negative effects of shortage,
which reduce production efficiency, Kornai observes yet another
cause-effect chain. A stable system, once thrown out of the state
of normal shortage intensity, thanks to the feedback mechanism
will return to the previous state. Similarly, an increase of
shortage above normal level creates quantity drive through   the
use of various extra undertaking, like overtime work, production
pledges, which lead to the production increase. Consequently, cur-
rent input reserves grow above the normal level in order to re-
turn to it soon after. Kornai calls the phenomena "the   effi-
ciency paradox of the shortage economy". With assumed   model's
stability, a computer simulation shows that the effects of   in-
creased shortage forcing production increase far surpass the ne-
gative effects of shortage, like reduced productivity and redu-
ced production efficiency (J. K o r n a i (1982), p. 97). Ef-
ficiency paradox explains the existence of two contradictory phe-
nomena: the existence of bottlenecks on microlevel, which ham-
pers attempts to increase production, simultaneously with   low
level of utilization on macrolevel.

On the contrary to inefficient use of resources in production,
the planned economy is highly efficient in employing its availab-
le resources. Using on the example of labor resources, J. K o r-
n a i (1982), (p. 108) points out, that due to certain type of
economic growth, within 20-30 years substantial labor   reserves
have been absorbed. When comparing population activity rates of

centrally planned economies and market economies on similar de-
velopment level, in the former the activity rate is almost   50%
higher. This proves, that in mobilizing labor, the planned eco-
nomy is highly efficient.

During the period of extensive growth, when labor   reserves
are being absorbed, shortage on the consumption market   accompa-
nies   the excess supply of labor. After labor reserves have been
absorbed, when the economy enters intensive period of   economic
growth, the growth strategy from the previous period is   conti-
nued. The strategy, which emphasized not the effective   utiliza-
tion of labor, but which maximized the amount of labor employed,
intensifies labor shortage once its reserves are exhausted.

Similarly as it is in the case of other resources in   short-
age, firms hoard labor. Shortage of labor on the macrolevel coin-
cides with "unemployment on the job" on a microlevel, so   exces-
sive to requirements, that a number of workers find no work   to
do while at work (J. K o r n a i   (1982), p.   111). Numerous
workers,   receiving low wages, have no incentive to   work full
time efficiently.

3.5. Summing up of Kornai's Model

J. K o r n a i (1982) constructed his growth model of the
centrally planned economy after he reappraised the microeconomic
foundations of neoclassical macroeconomic theory. Having analy-
zed the firms' behavior in the centrally planned economy, Kornai
rejected some assumptions of macroeconomic theory.

The most important rejected assumptions is an assumption about
a hard-budget constraint of economic agents. While rejecting it,
Kornai presents a hypothesis, that the prime reason of chronic
shortage in the planned economy is soft-budget constraint of the
state sector. In other words, Kornai considers attempts to cha-
racterize the state of the planned economy as repressed   infla-
tion incorrect, because in this type of economy, basic macroeco-
nomic variables are not genuinely influenced by money and prices.
Immediately coming question, what should be understood as "ge-
nuine influence" of monetary variables remains unanswered in the

cited work. This is unfortunate, because the hypothesis is con-
troversial. Attempts to manage the centrally planned economy ne-
glecting market forces have failed. Recent reforms tend to in-
crease the importance of monetary variables in stimulating eco-
nomic processes. This means that monetary variables play an im-
portant role in managing the planned economy. Therefore, they
should be included in its characteristics.

In the economy during the intensive period of growth, excess
demand prevails on both consumption and labor markets. Therefore,
the state of the centrally planned economy is properly character-
ized as repressed inflation.

Another assumption which Kornai rejects, is the assumption
about the quantity observable on the aggregated consumption mar-
ket, on which substitute goods are sold. In the case of excess
demand, due to forced substitution the quantity traded will not
be equal, but will be greater than smaller quantity from effec-
tive demand and supply. Close analysis of aggregated consumption
market confirms Kornai´s observation as correct (W. C h a r e m-
z a (1981)).

Controversial, however, are Kornai´s deliberations about la-
bor supply. He rejects widely accepted (W. H. B r a n s o n,
J. M. L i t v a c k, (1981), p. 110) relationship in favour
of others factors. Inference is not supported with data showing
the importance of the proposed factors and thus consequently un-
convincing.

I have serious reservations about efficiency paradox of the
shortage economy as well. Efficiency paradox results from model
stability property. The property convincingly explains only the
basically consistent growth of the centrally planned economy. In
further analysis, however, it leads to absurd conclusions. Effi-
ciency paradox implies, that within unspecified time limit in-
creased shortage produces a lasting production increase. Unclear
is only the production level before the increased shortage oc-
cured; if it were above, or below the normal level. Efficiency
paradox suggests one-way relationship between shortage and pro-
duction, as well as lack of vicious circle despite the feedback
mechanism. The existence of different feedback is, I believe,
more convincing. An increase of shortage causes production decline

and, consequently, drop in demand for raw materials as well. The
reduced demand for current inputs due to, for example, the inve-
stment vintage reduction, lowers shortage intensity. As a result,
production grows and reaches the previous level. Nothing guaran-
tees, however, that production surpasses the previous level.

Kornai´s model incorporates self-correcting mechanism. De-
viations of control variables from their normal values cause
real variables to return to their normal values. Reference point
of feedback mechanism are, therefore, normal values. The corre-
spond to non-zero value of basic exogeneous variable of the mo-
del - shortage intensity.

In the same time, even Hungarian reforms of institutional
framework have not made harder state sector soft-budget constr-
ants. Consequently, Kornai does not present measures to improve
the situation. Instead, he presents a vision of shortage spil-
ling over into all sectors of the economy, the economy which is
unable to break out of vicious circle of shortage reproduction.

4. Comparative Analysis of Portes´ and Kornai´s Models

When comparing two disequilibrium models of the centrally
planned economy, presented by R. Portes and J. Kornai, I want to
point out to certain similarities and substantial differences be-
tween the models. Common features of the models are the follo-
wing: they investigate permanent deviations from Walrasian equi-
librium and they have a built-in correcting mechanism. Diffe-
rences are extensive, however, most of them have the same origin
- different approach.

Portes adopts a short period equilibrium theory with ra-
tioning of a market economy. The theory, formulated by R. Barro,
H. Grossman, E. Malinvaud and others, was subsequently applied
by R. Portes to model the centrally planned economy. Kornai, on
the other hand, starts from the analysis of the centrally planned
economy. He finds that its characteristic feature is excess de-
mand, similarly as typical feature of a market economy is excess
supply. Having assumed excess demand as typical feature of the
centrally planned economy, he investigates the mechanism which

generates and reproduces shortage. He tries to define the impact of shortage on the economic growth rate as well as on consumption and production efficiency.

The result of different approaches are different views about variables, which properly characterize the planned economy. According to Portes, the variables are real variables, i.e., supply and demand of labor as well as monetary variables i.e., consumption demand, prices and wages. Kornai presents different and controversial view, that only real variables properly characterize the planned economy, while monetary variables are irrelevant. Consequently, authors differ in their views about proper indicators of shortage intensity. According to Portes, they are monetary variables, like, for example, aggregated excess demand. For Kornai, proper indicator of shortage intensity is a vector of partial real shortage indicators.

Because different variables play a dominant role in the economy, different are sources of shortage as well. For Portes, the reason of shortage on markets in question are inappropriate price level and wage rate. Too low level of prices and wages create the state of repressed inflation, which features excess demand for labor and consumption goods without price changes. For Kornai, shortage on the markets is only the external sing of the economy's behavior. The real reason of shortage is the institutional framework, which causes firms' soft-budget constraint. Shortage phenomena is, therefore, generated in the firms' sector and is not the effect of inadequate labor supply and excess consumption demand due to improper price level and wage rate.

The models incorporate different correcting mechanisms. Portes' correcting mechanism are planners' reactions to deviations of monetary and real variables from their planned values. In Kornai's system, deviations of control variables from their normal values force the return of real variables to their normal values.

Regulation mechanism analysis shows different reference points of regulation. In Portes' model, the reference point are the planned values. In Kornai's model, the reference point of regulation are the normal values of variables, which correspond to non-zero normal value of shortage intensity indicator.

As a result of differences presented above, authors of the models differ in their views about solutions to the situation. Only Portes presents clues how to improve the situation described by the model. Equiproportional change of prices and wages allows to move from repressed inflation to the general market equilibrium. For Kornai, the prerequisite to liquidate shortage are institutional reforms, which would force hard-budget constraint. According to Kornai, however, hard-budget constraint does not exist not only in the centrally planned economy, but in the contemporary market economy as well.

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TEORIA NIERÓWNOWAGI: R. PORTES A J. KORNAI
        - PORÓWNANIE KRYTYCZNE

W referacie porównano dwa podejścia do modelu   opisującego
gospodarkę centralnie planowaną w stanie nierównowagi. R. Portes
opiera swój model na teorii nierównowagi rynku, wskazując na nie-
odpowiedni poziom cen i płac jako przyczyny nadwyżki popytu. J.
Kornai odrzuca podstawy mikroekonomicznej teorii, w szczególno-
ści ograniczenia "twardego" budżetu w sektorze uspołecznionym,
argumentując, iż podstawową przyczyną niedoborów są rozwiązania
instytucjonalne kreujące ograniczenie "miękkiego" budżetu.

W rezultacie różnic w podejściu nierównowagi, modele różnią
się w zakresie zmiennych charakteryzujących gospodarkę,   mecha-
nizmów wzajemnych sprzężeń i nierównowagi.

W modelu Portesa proporcjonalny i równoważący wzrost cen   i
płac prowadzi do bilansowania rynków. Model Kornaiego   wskazuje
na stałą reprodukcję niedoborów.