Such a perspective can be backed by some conceptual and methodological clarifications, about a general framework that assumes a prior objective social structure, emphasizes the operation of intersubjective relations and recognizes the role of subjective impulses.

Objective structure, intersubjective relations and subjective impulses. When the jump is made from a real economy with money to a monetary economy with goods and services, money as the common unit of account is no longer a neglected monetary function[18], but constitutes the crucial economic feature. As a unit of account, money is the basic economic objectivity: it institutes a common economic language that is meant to be written as a nominal accounting. So economic values are quantitative because of their monetary expression and they are socially recognized thanks to the unit of their measurement. As a consequence, economic quantitativism is neither disembodied (as in mathematics) nor natural (as in physics): it is socially grounded in the qualitative framework of a constitution whose first article verbally creates a unit of account, a "nominal anchorage."

This fundamental convention is the keystone of an objective social institution, the payment system, which settles the rules of money creation, circulation and destruction. Through circulation, money determines all object exchanged for it as a commodity, whose value is given by the payment operation: prices are basically absolute in a monetary economy (as they are fundamentally relative in a real economy). Economic agents are recognized in the social structure of accounting by the engaged expenses and by the received receipts (as they are recognized by detained allocations and preferences defined in the social structure of the commodity space in a real economy)[19].

An individual *decides* her/his spendings but merely *records* her/his receipts. So agents granted with the monetary power of spending before earning benefit from the extended liberty of independent agents. And agents subjected to the monetary necessity of earning before spending have to content themselves with the limited liberty of dependent agents. For every individual, the effective spendings become part of others' receipts. But she/he does not control others' spendings, which partly become her/his receipts; she/he can't even perfectly foresee these others' spendings, as they are decided by other (more or less) free individuals.

A decentralized economy involves a plurality of free action takers: this of course means the absence of an economic dictator or a central planner. But this also entails the presence of a deep social opacity: a general endogenous uncertainty. As a consequence, the private evaluation of an individual or the evaluation she/he thinks she/he will be given by the others (expected receipts) and her/his effective social evaluation by the others (effective receipts) are likely to differ and mark an individual disequilibrium in decentralized economies such as pure market and capitalist economies.

Let's bring together all these elements, calling "*objective*" what is the same for all and imposed on each; "*subjective*" what is proper to each and decided by each; and "*intersubjective*" what occurs between several individuals (from two to all). First we have the objective framework, the rules of the game: the institution of money and the monetary institution of a pure market economy (introducing the

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[18] In their book "Animal spirits," Akerlof and Shiller [2009] notice, in a chapter dedicated to "Money illusion," that the functions of money as a medium of exchange and as a store of value "have been analyzed to death by economists […]. But economists have paid scant attention to the role of money as a unit of account. Its use as a unit of account means that people think in terms of money. It means that contracts are denominated in money terms. Likewise, accounting is denominated in nominal terms".

[19] Choosing R^n as the commodity space is not purely mathematical or economically obvious: it institutes goods as the basic economic objectivity, which constitutes the first postulate of theories of value.

market relation as a coordination feature) or of a capitalist economy (adding the wage relation as a subordination feature). Second we have subjective actions, essentially spending bids: situated in the objective framework, they are indeed intersubjective relations initiated by an individual decision (I decide to spend money you don't choose to receive). Third we have the objective outcome, the result of the game: through a process of emergence or self-transcendence, a social statement comes from all intersubjective relations and comes back as an objective judgment for each individual (her/his monetary balance).

This epistemological development reveals an approach which could be called "soft structuralism" or "relational individualism": individuals make decisions and take actions in a socially determined context, which means from a defined economic position (entrepreneur or wage-earner) and in the network of economic relations (payments). Engaging and engaged by social relations, interdependent individuals are, at the same time and at different degrees, independent and dependent. Two versions of this approach may eventually be distinguished, considering what should or could be said about individual psychology.

From a more formal and explanatory point of view, we should strictly focus our attention on the "hard" object of structuring and structured social relations[20], whose objectivity provides social science a solid ground, under the specific form of social and quantitative variables for economics. As conscious motivations or unconscious forces are too uncertain or too "soft" to be seriously considered, psychological considerations should be ignored or minimized[21].

From a more substantive and comprehensive point of view, we should first focus our attention on social relations but then turn towards individual driving forces. Individual action is always socially defined and even partly socially determined, but a social system can't function and reproduce itself without some individual *impetus*. So it is legitimate to wonder if agents who are running a pure market economy are moved by the satisfaction of needs, the search for utility or the "propensity to truck, barter and exchange one thing for another." And it is also relevant to wonder why, beyond systemic constraints, capitalists engage themselves in the dynamics of accumulation. Which "animal spirit" is at stake when a market jump is made, especially when a deeply uncertain and definitely strategic investment decision is made: a Schumpeterian desire to keep busy and to undertake new projects, or a Freudian desire of money, which is the desire of always more money? In any case, if money should be first considered as an institution, it might or should then be envisioned as the reified and even fetishied object of strong economic passions, under the conservative form of miser preservation (for the rentier) or under the destructive-creative form of indefinite accumulation (for the capitalist). The rationality of the "demand for money" and of "profit maximization" may ultimately be the rationalization of individual motivations driven by some "monetary illusion."

[20] For an explicitly structuralist macroeconomic construction, see Taylor [2004].
[21] Such a point of view is defended by Benetti and Cartelier [1980].

Appendix 1: Development of model I.

1- Individual optimal choices.

Given the price system $P = (p_1 ; p_2)$, prices expressed in a conventional *numéraire*,
each agent h (= a, b, c, d) maximizes her/his utility U_h under the budget constraint $P . Z_h = 0$,
where Z_h is the vector of excess demands for h: $z_{kh}(P) = x_{hk}(P) – \underline{x}_{hk}$ (k = 1,2).
If $U_h = x_{1h} x_{2h}$, $Z_a = Z_b = (-0,5 ; 0,5(p_1/p_2))$ and $Z_c = Z_d = (0,5(p_2/p_1) ; -0,5)$.
If $U_h = x_{1h}^{1/2} + x_{2h}^{1/2}$, $Z_a = Z_b = [-p_1 / (p_1+p_2) ; p_1^2 / p_2(p_1+p_2)]$ and $Z_c = Z_d = [p_2^2 / p_1(p_1+p_2)] ; -p_2 / (p_1+p_2)]$.

2- Equilibrium prices and allocations.

The general equilibrium of this economy is determined when (for instance) $\sum_h z_{1h}(P^e) = 0$.
The economy being symmetrical, the general equilibrium is obtained when $p_1 = p_2$.
If $U_h = x_{1h} x_{2h}$ or if $U_h = x_{1h}^{1/2} + x_{2h}^{1/2}$, $Z_a^e = Z_b^e = (-0,5 ; 0,5)$ and $Z_c^e = Z_d^e = (0,5 ; -0,5)$.
The equilibrium allocations are:
$(c'_{1a}{}^e ; c_{2a}{}^e) = (\underline{x}_{1a} + z_{1a}{}^{e-} ; z_{2a}{}^{e+})$ and same thing for b; $(c_{1c}{}^e ; c'_{2c}{}^e) = (z_{1c}{}^{e+} ; \underline{x}_{2c} + z_{2c}{}^{e-})$ and same thing for d.
The economy being symmetrical, the equilibrium allocations are identical: $(c_{1h}{}^e ; c_{2h}{}^e) = (0,5 ; 0,5)$.

3- Implementation of equilibrium exchanges.

If equilibrium trade is centralized, everybody brings all the equilibrium supplies to the clearing house (or *chambre de compensation*) and then comes back to collect all the equilibrium demands.

If equilibrium trade is decentralized, then we have to explain how a and b deliver good 1 to c and d and how c and d deliver good 2 to a and b. In the following quasi-matrix, bilateral trade coefficients λ, μ, ψ and φ (which are ≥ 0 and ≤ 1) have been introduced to describe who gets what from whom.

↗	a.	b.	c.	d.	∑ (ini. alloc. $\underline{X}_h$)
a.	$(c'_{1a}{}^e ; 0)$	(0 ; 0)	$((1-\psi)c_{1c}{}^e ; 0)$	$((1-\varphi)c_{1d}{}^e ; 0)$	(1 ; 0)
b.	(0 ; 0)	$(c'_{1b}{}^e ; 0)$	$(\psi c_{1c}{}^e ; 0)$	$(\varphi c_{1d}{}^e ; 0)$	(1 ; 0)
c.	$(0 ; (1-\lambda)c_{2a}{}^e)$	$(0 ; (1-\mu)c_{2b}{}^e)$	$(0 ; c'_{2c}{}^e)$	(0 ; 0)	(0 ; 1)
d.	$(0 ; \lambda c_{2a}{}^e)$	$(0 ; \mu c_{2b}{}^e)$	(0 ; 0)	$(0 ; c'_{2d}{}^e)$	(0 ; 1)
∑ (equi. alloc. X_h^e)	$(c'_{1a}{}^e ; c_{2a}{}^e)$	$(c'_{1b}{}^e ; c_{2b}{}^e)$	$(c_{1c}{}^e ; c'_{2c}{}^e)$	$(c_{1d}{}^e ; c'_{2d}{}^e)$	(2 ; 2)

Quasi-matrix of bilateral real flows of model I: (good 1 ; good 2).

Does everybody get what (s)he is supposed to get? These “getting conditions” are obviously respected, for any possible value of the bilateral trade coefficients.
Does everybody give what (s)he is supposed to give? These “giving conditions” are respected if:
$1 - c'_{1a}{}^e = (1-\psi)c_{1c}{}^e + (1-\varphi)c_{1d}{}^e$ for a and $1 - c'_{1b}{}^e = \psi c_{1c}{}^e + \varphi c_{1d}{}^e$ for b,
$1 - c'_{2c}{}^e = (1-\lambda)c_{2a}{}^e + (1-\mu)c_{2b}{}^e$ for c and $1 - c'_{2d}{}^e = \lambda c_{2a}{}^e + \mu c_{2b}{}^e$ for d.
If a and b are indeed identical ($c'_{1a}{}^e = c'_{1b}{}^e$ and $c_{2a}{}^e = c_{2b}{}^e$) and likewise for c and d,
then we must have $\psi + \varphi = 1$ and $\lambda + \mu = 1$ for the “giving conditions” to be respected.
So the general equilibrium barter could for instance be achieved by two separate bilateral matches, between a and c (λ = 0 and ψ = 0) and between b and d (μ = 1 and φ = 1). But as the general equilibrium approach features the notion of general interdependence, exchange is perhaps better accomplished by a global barter (easily obtained when λ = μ = ψ = φ = 1/2), so we select this scenario in the quasi-matrix initially given in the text.

Appendix 2: Development of model II.

1- Market projection and exchange engagement.

Under expected monetary prices $P = (p_1 ; p_2)$, each agent h maximizes her/his utility U_h under the expected budget constraint $P . Z_h = 0$.
When $z_{kh} < 0$, agent h supplies good k and bring to market k a supply (in volume) $o_{kh} = |z_{kh}^-|$ (real bid).
When $z_{kh} > 0$, agent h demands good k and expresses on market k a demand (in value) $M_{kh} = p_k z_{kh}^+ = p_k d_{kh}$ (monetary bid), for which she/he requests a minting operation.
If $U_h = x_{1h} x_{2h}$, $Z_a = Z_b = (-0,5 ; 0,5(p_1/p_2))$ and $Z_c = Z_d = (0,5(p_2/p_1) ; -0,5)$,
so $o_{1a} = o_{1b} = 0,5$ and $M_{2a} = M_{2b} = 0,5p_1$; $o_{2c} = o_{2d} = 0,5$ and $M_{1c} = M_{1d} = 0,5p_2$.
If $U_h = x_{1h}^{1/2} + x_{2h}^{1/2}$, $Z_a = Z_b = [-p_1 / (p_1+p_2) ; p_1^2 / p_2(p_1+p_2)]$ and $Z_c = Z_d = [p_2^2 / p_1(p_1+p_2)] ; -p_2 / (p_1+p_2)]$,
so $o_{1a} = o_{1b} = p_1 / (p_1+p_2)$ and $M_{2a} = M_{2b} = p_1^2 / (p_1+p_2)$; $o_{2c} = o_{2d} = p_2 / (p_1+p_2)$ and $M_{1c} = M_{1d} = p_2^2 / (p_1+p_2)$.

2- Formation of market prices and market circulation.

Under the "Cantillon-Smith rule" (Benetti and Cartelier [2001]), the price of a good is given by the ratio between the money brought to the market to be spent and the goods brought to the market to be sold, so we have $p_1^* = (M_{1c}+M_{1d}) / (o_{1a}+o_{1b}) = p_2$ and $p_2^* = (M_{2a}+M_{2b}) / (o_{2c}+o_{2d}) = p_1$.
If $U_h = x_{1h} x_{2h}$, then $p_1^* = p_2$ and $p_2^* = p_1$.
If $U_h = x_{1h}^{1/2} + x_{2h}^{1/2}$, then $p_1^* = p_2^2 / p_1$ and $p_2^* = p_1^2 / p_2$.

With this specific rule of price formation, market sanction involves receipts and purchases but does not affect expenses and sales:
- The volume of supply or expected sale (o_{kh}) equals the effective sale (v_{kh}).
- The value of demand or expected expenses (M_{kh}) equals the effective expenses (A_{kh}).
- Expected receipts ($p_k o_{kh}$) differ from effective receipts ($V_{kh} = p_k^* v_{kh} = p_k^* o_{kh}$) if $p_k \neq p_k^*$.
- Expected purchase (d_{kh}) differs from effective purchase ($a_{kh} = A_{kh} / p_k^* = (p_k/p_k^*) d_{kh}$) if $p_k \neq p_k^*$.

3- Market results: effective allocations and monetary balances.

With the Cobb Douglas utility function, the real and the monetary positions are:
$(1-v_{1a} ; a_{2a}) = (0,5 ; 0,5)$ and $S_a = V_{1a} - A_{2a} = 0,5 (p_2 - p_1)$ for a and idem for b.
$(a_{1c} ; 1-v_{2c}) = (0,5 ; 0,5)$ and $S_c = V_{2c} - A_{1c} = 0,5 (p_1 - p_2)$ for c and idem for d.

With the additive utility function, the real and the monetary positions are:
$(1-v_{1a} ; a_{2a}) = (p_2 / (p_1+p_2) ; p_2 / (p_1+p_2))$ and $S_a = V_{1a} - A_{2a} = p_2 - p_1$ for a and idem for b.
$(a_{1c} ; 1-v_{2c}) = (p_1 / (p_1+p_2) ; p_1 / (p_1+p_2))$ and $S_c = V_{2c} - A_{1c} = p_1 - p_2$ for c and idem for d.

An equilibrium for this monetary economy corresponds to correct price expectations ($p_k = p_k^*$ for all k). Such self-fulfilling prices coincide with Walrasian prices ($p_1 = p_2$) and generate the Walrasian allocation with a nil monetary balance for every individual.

A disequilibrium corresponds to incorrect price expectations ($p_k \neq p_k^*$ for at least one k), which entail positive and negative monetary balances (which need to be settled).

In any case, the emerging general allocation is feasible and the social monetary balance is nil.

Appendix 3: Development of model III.

1- The entrepreneurs-consumers' planning.
The owners-managers notice the level of the exogenous monetary wage and take the expected prices of the commodities as given: (w_0; p_1; p_2) = (wage; expected price of good 1 ; expected price of good 2).
Optimizing program of a: Max $U_a(c'_{1a}; c_{2a})$ subject to the expected budget constraint, $R_a = D_a$ (or $\pi_a = p_1 q_{1a} - w_0 \int_{1a} = p_1 c'_{1a} + p_2 c_{2a}$), and to the technological constraint, $q_{1a} = f_{1a}(\int_{1a})$.
First order optimality conditions are: $MUc'_{1a}/MUc_{2a} = (p_1/p_2)$ and $MP\int_{1a} = (w_0/p_1)$.
This way, c'_{1a}, c_{2a}, q_{1a}, $\int_{1a}$ and π_a, R_a, D_a are determined as functions of (w_0; p_1; p_2).
For c, one can the same way determine c'_{2c}, c_{1c}, q_{2c}, $\int_{2c}$ and π_c, R_c, D_c as functions of (w_0; p_1; p_2).
This kind of utility maximization requires a maximization of the expected revenue:
π_j has to be maximized for U_j to be maximized.

2- Purchase of labor and production.
Labor demands are supposed to be satisfied, by b for a and by d for c:
$\int_{1a}$ (labor demanded by a) = $\int_{1a}$ (labor bought by a) = t_{1b} (labor sold by b).
Likewise for employer c and her/his employee d: $\int_{2c} = \int_{2c} = t_{2d}$.
Production and wage payment follow:
$q_{1a} = q_{1a}$ and $W_{1b} = w_0 t_{1b}$ for enterprise 1; $q_{2c} = q_{2c}$ and $W_{2d} = w_0 t_{2d}$ for enterprise 2.
According to this view, there is not a genuine "labor market," as the aggregate labor demand determines the level of employment, labor suppliers passively adjusting to the entrepreneurs' wishes.

3- Engagement of money to be spent and of goods to be sold on the markets.
Every entrepreneur is a supplier on her/his market and a demander on the other market.
Entrepreneur a offers $o_{1a} = q_{1a} - c'_{1a}$ on market 1 and bids $M_{2a} = p_2 c_{2a}$ on market 2.
Entrepreneur c offers $o_{2c} = q_{2c} - c'_{2c}$ on market 2 and bids $M_{1c} = p_1 c_{1c}$ on market 1.
For the wage earners, let's denote by β and δ the fractions of their wages b and d respectively devoted to the purchase of good 1. These preference parameters appear as exogenous budget coefficients, but they could be endogenized through the maximization of a Cobb-Douglas utility function.
Wage earner b engages $M_{1b} = \beta\, W_{1b}$ on market 1 and $M_{2b} = (1-\beta)\, W_{1b}$ on market 2.
Wage earner d engages $M_{1d} = \delta\, W_{2d}$ on market 1 and $M_{2d} = (1-\delta)\, W_{2d}$ on market 2.

4- Formation of market prices following the Cantillon-Smith rule.
$p_1 = [M_{1b} + M_{1c} + M_{1d}] / [o_{1a}] = M_1 / o_1$ on the market of good 1.
$p_2 = [M_{2a} + M_{2b} + M_{2d}] / [o_{2c}] = M_2 / o_2$ on the market of good 2.

5- Market results: emergence of effective outgoings-incomings and purchases-sales.
We denote purchases by a, sales by v, expenses by A and receipts by V.
For a: the sale $v_{1a} = o_{1a}$ and the receipt $V_{1a} = p_1 v_{1a}$; the spending $A_{2a} = M_{2a}$ and the purchase $a_{2a} = A_{2a}/p_2$.
For c: the sale $v_{2c} = o_{2c}$ and the receipt $V_{2c} = p_2 v_{2c}$; the spending $A_{1c} = M_{1c}$ and the purchase $a_{1c} = A_{1c}/p_1$.
For b: the expenses are $A_{1b} = M_{1b}$ et $A_{2b} = M_{2b}$ and the purchases are $a_{1b} = A_{1b}/p_1$ et $a_{2b} = A_{2b}/p_2$.
For d: the expenses are $A_{1d} = M_{1d}$ et $A_{2d} = M_{2d}$ and the purchases are $a_{1d} = A_{1d}/p_1$ et $a_{2d} = A_{2d}/p_2$.

6- Final allocations.
Final bundle for a: $(c'_{1a}; c_{2a}) = (q_{1a} - v_{1a}; a_{2a}) = (q_{1a} - o_{1a}; M_{2a}/p_2) = (c'_{1a}; (p_2/p_2)\, c_{2a})$.
Final bundle for c: $(c_{1c}; c'_{2c}) = (a_{1c}; q_{2c} - v_{2c}) = (M_{1c}/p_1; q_{2c} - o_{2c}) = ((p_1/p_1)\, c_{1c}; c'_{2c})$.
Final bundle for b: $(c_{1b}; c_{2b}) = (a_{1b}; a_{2b}) = (M_{1b}/p_1; M_{2b}/p_2) = (\beta W_{1b}/p_1; (1-\beta)W_{1b}/p_2)$.
Final bundle for d: $(c_{1d}; c_{2d}) = (a_{1d}; a_{2d}) = (M_{1d}/p_1; M_{2d}/p_2) = (\delta W_{2d}/p_1; (1-\delta)W_{2d}/p_2)$.

At the macro level, it can be verified that $c'_{1a} + (p_1/p_1)\, c_{1c} + \beta W_{1b}/p_1 + \delta W_{2d}/p_1 = c'_{1a} + o_{1a} = q_{1a}$ and that $(p_2/p_2)\, c_{2a} + c'_{2c} + (1-\beta)W_{1b}/p_2 + (1-\delta)W_{2d}/p_2 = c'_{2c} + o_{2c} = q_{2c}$: the final allocation is indeed feasible.

7- Monetary balances.
Monetary balance for a: $S_a = V_{1a} - A_{2a} - W_{1b} = (\ldots) = [A_{1c} + A_{1d}] - [A_{2a} + A_{2b}]$.
Monetary balance for c: $S_c = V_{2c} - A_{1c} - W_{2d} = (\ldots) = [A_{2a} + A_{2b}] - [A_{1c} + A_{1d}]$.
One entrepreneur's monetary balance appears as the difference between the inflows and the outflows of her/his monetary zone: $[A_{1c} + A_{1d}]$ is the monetary leak from c's sphere to a's one (purchase of 1 by c and d) and $[A_{2a} + A_{2b}]$ is the monetary leak from a's sphere to c's one (purchase of 2 by a and b).
Under the Cantillon-Smith rule, one entrepreneur's balance only depends on the uncertainty of her/his receipts (effective / expected), because the effective expenses are equal to the expected ones.
Monetary balance for b: $S_b = W_{1b} - A_{1b} - A_{2b} = W_{1b} - \beta\, W_{1b} - (1-\beta)\, W_{1b} = 0$.
Monetary balance for d: $S_d = W_{2d} - A_{1d} - A_{2d} = W_{2d} - \delta\, W_{2d} - (1-\delta)\, W_{2d} = 0$.
At the macro level, we verify that $S = S_a + S_c + S_b + S_d = 0$ (the total balance is nil):
$S = V_{1a} - A_{2a} - W_{1b} + V_{2c} - A_{1c} - W_{2d} + W_{1b} - A_{1b} - A_{2b} + W_{2d} - A_{1d} - A_{2d} =$
$[V_{1a} - A_{1c} - A_{1b} - A_{1d}] + [V_{2c} - A_{2a} - A_{2b} - A_{2d}] = 0 + 0 = 0$.
As $S_b = S_d = 0$ (every wage earner's balance is nil),
we also verify that $S_a + S_c = 0$ (the entrepreneurs total balance is nil).

As $S_a = V_{1a} - A_{2a} - W_{1b} = p_1\, o_{1a} - (p_2\, c_{2a} + W_{1b}) = p_1\, o_{1a} - p_1\, o_{1a} = [p_1 - p_1]\, o_{1a}$ (because $R_a = D_a$)
and $S_c = V_{2c} - A_{1c} - W_{2d} = p_2\, o_{2c} - (p_1\, c_{1c} + W_{2d}) = p_2\, o_{2c} - p_2\, o_{2c} = [p_2 - p_2]\, o_{2c}$ (because $R_c = D_c$),
we have: $S = [p_1 - p_1]\, o_{1a} + [p_2 - p_2]\, o_{2c} = 0$ (Walras law).
It follows that there are three possible situations for the markets:
if $p_1 = p_1$ and $p_2 = p_2$ ($S_a = 0$ and $S_c = 0$), then equilibrium in 1 and equilibrium in 2.
if $p_1 < p_1$ and $p_2 > p_2$ ($S_a < 0$ and $S_c > 0$), then overproduction in 1 and underproduction in 2.
if $p_1 > p_1$ and $p_2 < p_2$ ($S_a > 0$ and $S_c < 0$), then underproduction in 1 and overproduction in 2.

As a convention, the receipts (R) and the expenses (D) include the value of self-consumption,
while the value of the sales (V) and the value of the purchases (A) don't include it,
which of course doesn't change anything to the calculus of the balances:
For a, $S_a = R_a - D_a = [V_{1a} + p_1 c'_{1a}] - [A_{2a} + W_{1b} + p_1 c'_{1a}] = V_{1a} - A_{2a} - W_{1b}$.
For c, $S_c = R_c - D_c = [V_{2c} + p_2 c'_{2c}] - [A_{1c} + W_{2d} + p_2 c'_{2c}] = V_{2c} - A_{1c} - W_{2d}$.

8- Entrepreneurs' profits.
As $\pi_a = p_1 q_{1a} - W_{1b}$ and $\pi_a = p_1 q_{1a} - W_{1b}$, a's windfall result is: $WR_a = \pi_a - \pi_a = [p_1 - p_1]\, q_{1a}$.
Likewise for c: $WR_c = \pi_c - \pi_c = [p_2 - p_2]\, q_{2c}$.
In profits net of self-consumptions, the windfall results correspond to the monetary balances.

9- State of equilibrium.
If the price expectations are correct ($p_1 = p_1$ and $p_2 = p_2$), then $S_a = S_c = 0$ and $WR_a = WR_c = 0$ on the monetary side and $(c'_{1a}; c_{2a}) = (c'_{1a}; c_{2a})$ and $(c_{1c}; c'_{2c}) = (c_{1c}; c'_{2c})$ on the real side:
so the targeted allocation is attained, with a balanced effective budget constraint, for any capitalist.

NB: Identification of the notations used in the text and the ones used in this appendix:
Volumes of consumption (c) correspond to the amounts of good purchases (a) and to the volumes of self-consumption (c'). Values of consumption (C) correspond to the levels of consumption expenses (A) and to the values of self-consumption (C').

Appendix 4: Development of model IV.

Let's develop this model from the basis of the former one, highlighting the changes introduced. To emphasize the dissymmetry between consumption and investment, we keep the same rule of price formation for good 2 but turn to a different rule for good 1. Unlike the flexible Cantillon-Smith rule kept for the consumption good, we choose a fixed price rule for this investment good.

1- The capitalists' investment decisions.
Considering the expected price p_1 of the production good, the interest rate to come and more generally their expectations about the following periods, capitalists determine their level of investment: i'_{1a} for a and i_{1c} for c. Notice that if the current period carries a certain degree of uncertainty and entails some market jump and sanction, the uncertainty intrinsic to investment decisions is even greater, as it involves deeply uncertain variables: the evolution of profits and of the interest rate in the future periods.

2- The capitalists' production decisions.
Given the exogenous wage w_0 and the expected price p_1 of the investment good, a is assumed to maximize $\pi_a = p_1 q_{1a} - w_0 \int_{1a}$ under the technological constraint $q_{1a} = f_{1a}(\int_{1a})$. The optimality condition equalizing $MP\int_{1a}$ and (w_0/p_1) enables the determination of q_{1a}, $\int_{1a}$ and π_a as functions of w_0 and p_1. Capitalist a indeed produces $q_{1a} = q_{1a}$ using labor brought by b ($\int_{1a} = \int_{1a} = t_{1b}$) in exchange of a wage payment ($W_{1b} = w_0 t_{1b}$).
Likewise, c maximizes $\pi_c = p_2 q_{2c} - w_0 \int_{2c}$ under $q_{2c} = f_{2c}(\int_{2c})$, which gives q_{2c}, $\int_{2c}$ and π_c as functions of w_0 and p_2. Capitalist c produces $q_{2c} = q_{2c}$ using labor brought by b ($\int_{2c} = \int_{2c} = t_{2d}$) in exchange of a wage payment ($W_{2d} = w_0 t_{2d}$).

3- The consumption spending decisions.
For capitalists, profits are supposed to cover investment and consumption spendings, under the simplifying assumption of self-financing. As the accumulation process prevails, the financing of investment spendings comes first and consumption spendings are residual.
For a, $\pi_a = p_1 i'_{1a} + p_2 c_{2a} = I'_{1a} + C_{2a}$, which determines C_{2a} as a residue: $C_{2a} = \pi_a - I'_{1a}$ (assumed to be > 0).
For c, $\pi_c = p_1 i_{1c} + p_2 c'_{2c} = I_{1c} + C'_{2c}$, which determines C'_{2c} as a residue: $C'_{2c} = \pi_c - I_{1c}$ (assumed to be > 0).
For wage earners, all the revenue is used to buy the consumption good:
worker b engages $M_{2b} = W_{1b}$ and worker d engages $M_{2d} = W_{2d}$ on market 2.

4- Market actions, market prices and market results.
Capitalist a decides to self-invests i'_{1a} and offers $o_{1a} = q_{1a} – i'_{1a}$ on market 1.
On the other side of market 1, c demands i_{1c}.
The market price is $p_1 = p_1$ for the investment good.
First case: if $o_{1a} = i_{1c}$ (equilibrium), then $i_{1c} = i_{1c}$ and $i'_{1a} = i'_{1a}$; and we also have $I_{1c} = I_{1c}$ and $I'_{1a} = I'_{1a}$.
Second case: if $o_{1a} > i_{1c}$ (overproduction), then $i_{1c} = i_{1c}$ and $i'_{1a} > i'_{1a}$ (unsold good): $i'_{1a} = q_{1a} - i_{1c}$.
Third case: if $o_{1a} < i_{1c}$ (underproduction), then $i'_{1a} = i'_{1a}$ and $i_{1c} < i_{1c}$ (unbought good): $i_{1c} = q_{1a} – i'_{1a}$.
In any case, we have i_{1c} or $a_{1c} = \mathrm{Min}[i_{1c}; o_{1a}] = v_{1a}$ (the exchange being voluntary and efficient); and we can denote the exchanged quantity of good 1 in a neutral way (purchase and sale) by e_1: $e_1 = \mathrm{Min}[o_{1a}; i_{1c}]$.

Capitalist c self-consumes $c'_{2c} = c'_{2c} = C'_{2c} / p_2$ and offers $o_{2c} = q_{2c} – c'_{2c}$ on market 2.
On the other side of market 2, a bids $M_{2a} = C_{2a}$ or $p_2 c_{2a}$, b engages $M_{2b} = W_{1b}$ and d engages $M_{2d} = W_{2d}$.
The market price is $p_2 = [M_{2a} + M_{2b} + M_{2d}] / [o_{2c}] = M_2 / o_2$ for the consumption good.
For c: $v_{2c} = o_{2c}$ and $V_{2c} = p_2 v_{2c} = p_2 o_{2c}$.
For a: $A_{2a} = M_{2a}$ and $a_{2a} = M_{2a}/p_2$. For b: $A_{2b} = M_{2b}$ and $a_{2b} = M_{2b}/p_2$. For d: $A_{2d} = M_{2d}$ and $a_{2d} = M_{2d}/p_2$.

5- Final allocations.
Final bundle for a: $(i'_{1a}; c_{2a}) = (q_{1a} - v_{1a}; a_{2a}) = (q_{1a} - e_1; A_{2a}/p_2) = (q_{1a} - e_1; M_{2a}/p_2) = (q_{1a} - e_1; (\mathit{p}_2/p_2)\ \mathit{c}_{2a})$.
Final bundle for c: $(i_{1c}; c'_{2c}) = (a_{1c}; q_{2c} - v_{2c}) = (e_1; q_{2c} - o_{2c}) = (e_1; \mathit{c}'_{2c})$.
Final bundle for b: $(i_{1b}; c_{2b}) = (0; a_{2b}) = (0; A_{2b}/p_2) = (0; M_{2b}/p_2) = (0; W_{1b}/p_2)$.
Final bundle for d: $(i_{1d}; c_{2d}) = (0; a_{2d}) = (0; A_{2d}/p_2) = (0; M_{2d}/p_2) = (0; W_{2d}/p_2)$.
At the macro level, it can be verified that $q_{1a} - e_1 + e_1 = q_{1a}$ and that
$(\mathit{p}_2/p_2)\ \mathit{c}_{2a} + \mathit{c}'_{2c} + W_{1b}/p_2 + W_{2d}/p_2 = \mathit{c}'_{2c} + v_{2c} = q_{2c}$: the final allocation is indeed feasible.

6- Monetary balances and windfall results.
Monetary balance for a: $S_a = V_{1a} - A_{2a} - W_{1b} = [A_{1c}] – [A_{2a} + A_{2b}]$.
Monetary balance for c: $S_c = V_{2c} - A_{1c} - W_{2d} = [A_{2a} + A_{2b}] – [A_{1c}]$.
Monetary balance for b: $S_b = W_{1b} - A_{2b} = 0$.
Monetary balance for d: $S_d = W_{2d} - A_{2d} = 0$.
One verifies that $S = S_a + S_c + S_b + S_d = 0$ (because of the monetary general structure)
and that $S_a + S_c = 0$ (because of the monetary capitalist structure).

As $S_a = R_a - D_a - \mathit{R}_a + \mathit{D}_a = p_1v_{1a} – p_2c_{2a} – W_{1b} – p_1o_{1a} + \mathit{p}_2\mathit{c}_{2a} + W_{1b} = \mathit{p}_1\ (v_{1a} - o_{1a}) – p_2c_{2a} + \mathit{p}_2\mathit{c}_{2a} = \mathit{p}_1\ (e_1 - o_{1a})$
and $S_c = R_c - D_c - \mathit{R}_c + \mathit{D}_c = p_2c_{2a} + p_2c_{2b} – p_1i_{1c} - \mathit{p}_2o_{2c} + \mathit{p}_1\mathit{i}_{1c} + W_{2d} = \mathit{p}_1\ (\mathit{i}_{1c} - e_1) + o_{2c}\ (p_2 – \mathit{p}_2)$,
we have: $S = \mathit{p}_1\ (\mathit{i}_{1c} - o_{1a}) + o_{2c}\ (p_2 - \mathit{p}_2) = 0$ (Walras' law).
It follows that there are three possible situations for the markets:
if $\mathit{i}_{1c} = o_{1a}$ and $p_2 = \mathit{p}_2$ ($S_a = 0$ and $S_c = 0$), then equilibrium in 1 and equilibrium in 2.
if $\mathit{i}_{1c} < o_{1a}$ and $p_2 > \mathit{p}_2$ ($S_a < 0$ and $S_c > 0$), then overproduction in 1 and underproduction in 2.
if $\mathit{i}_{1c} > o_{1a}$ and $p_2 < \mathit{p}_2$ ($S_a = 0$ and $S_c = 0$), then underproduction in 1 and overproduction in 2.

$WR_a = \pi_a - \mathit{\pi}_a = \mathit{p}_1\ (\mathit{i}_{1a} + e_1) - W_{1b} - \mathit{p}_1\ (\mathit{i}_{1a} + o_{1a}) + W_{1b} = \mathit{p}_1\ (e_1 - o_{1a})$.
if $o_{1a} = \mathit{i}_{1c}$ (equilibrium in 1), then $e_1 = o_{1a}$ and $WR_a = 0$.
if $o_{1a} > \mathit{i}_{1c}$ (overproduction in 1), then $o_{1a} > e_1$ and $WR_a < 0$.
if $o_{1a} < \mathit{i}_{1c}$ (underproduction in 1), then $e_1 = o_{1a}$ and $WR_a = 0$.

$WR_c = \pi_c - \mathit{\pi}_c = p_2\ q_{2c} - W_{2d} - \mathit{p}_2\ \mathit{q}_{2c} + W_{2d} = (p_2 - \mathit{p}_2)\ q_{2c}$.
if $p_2 = \mathit{p}_2$ (equilibrium in 2), then $WR_c = 0$.
if $p_2 > \mathit{p}_2$ (underproduction in 2), then $WR_c > 0$.
if $p_2 < \mathit{p}_2$ (overproduction in 2 [so underproduction in 1]), then $WR_c < 0$.

The "underproduction in 1 and overproduction in 2" case deserves clarification. For a, the underproduction in 1 is indeed ineffective ($S_a = 0$ and $WR_a = 0$) as (s)he sells the expected quantity at the expected price. For c, the overproduction in 2 makes the actual receipts smaller than the expected ones (so $WR_c < 0$). On market 1, c wanted to spend $p_1\mathit{i}_{1c}$ but actually spent only p_1e_1, and this unused amount of money compensates the missing receipts $[\mathit{p}_1\ (\mathit{i}_{1c} - e_1) = o_{2c}\ (p_2 – \mathit{p}_2)]$, so in the end $S_c = 0$.

7- State of equilibrium.
If $o_{1a} = \mathit{i}_{1c}$ and $p_2 = \mathit{p}_2$, then $S_a = S_c = 0$ and $WR_a = WR_c = 0$ on the monetary side
and $(i'_{1a}; c_{2a}) = (\mathit{i}'_{1a}; \mathit{c}_{2a})$ and $(i_{1c}; c'_{2c}) = (\mathit{i}_{1c}; \mathit{c}'_{2c})$ on the real side:
so the targeted allocation is attained, with a balanced effective budget constraint, for any capitalist.

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