

Workers, Skills, Firms and Banks: the second part of the story of a Simulation Model with *jESOF*^Y

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How would he look, to see his work so noble
Vilely bound up? (...)
Shakespeare, Winter's Tale

1. ABSTRACT

The simulation model is based on jES (java Enterprise Simulator) and on jESOF (jES Open Foundation), a jES generalization built to simulate multi-model frameworks of system of units or agents. Both the packages are based on Swarm. The Workers, Skills, Firms and Banks (WSFB) comes from the Workers, Skill, Firms (WSF) model.

The goal of this “bank model” is to discover how banks’ behavior affects the dynamic of the system, which is now built upon three interacting populations: workers, firms, banks.

Please refer to `workers_skills_firms.pdf` document in `apps/workers_skills_firms` folder as a preliminary information source, strictly linked with this document.

2. THE MODEL v.0

The version 0 of the WSFB model is derived from the version 1 of the WSF model, adding a new stratum: the sixth one (with number 5), to represented firms doubled in size, and the seventh one, with banks.

A second `orderDistiller` is used now, managed in stratum 5, to deal with the enterprise doubling process and both banks behavior and their interaction with firms (in version 1).

Always in the folder `unitData0/` we have now the definition of a second matrix, numbered 1, to be used with the part of the model added in this paper.

2.1 ENTERPRISE DOUBLING PROCESS

In the previous WSF model we were using the 1251 CS to create (for display reasons only) a copy of all the units with phase 1 (modifying the phase code to 101, to avoid duplications in action), and 1252, 1253 for the units with phases 2 and 3.

Similarly we use here the 1261² CS to double units with phase 1001 (and similarly 1262 and 1263 for 1002 and 1003) to double firms from their stratum 4 to stratum 5, without the

^Y Related to `jesopenfoundation-0.1.81`.

modification of the phase code, because here we are doubling the production capability of the original firm. We add here the information about the threshold the visibility value has to pass to apply the duplication process.

Probability for recipe 1001 in stratum 4, duplicating firms of type 1001 in another stratum (0.5)	the stratum where to display units of type 1001 (5)	amount (integer value of the addendum) to be added the production phase of the units created as a copy of an original unit (0.0)	Visibility threshold; if the visibility of the unit is \geq the threshold, the unit is duplicated (150.0 or 200.0)
Probability for recipe 1002 in stratum 4, duplicating firms of type 1002 in another stratum (0.5)	the stratum where to display units of type 1002 (5)	amount (integer value of the addendum) to be added the production phase of the units created as a copy of an original unit (0.0)	Visibility threshold; if the visibility of the unit is \geq the threshold, the unit is duplicated (150.0 or 200.0)
Probability for recipe 1003 in stratum 4, duplicating firms of type 1003 in another stratum (0.5)	the stratum where to display units of type 1003 (5)	amount (integer value of the addendum) to be added the production phase of the units created as a copy of an original unit (0.0)	Visibility threshold; if the visibility of the unit is \geq the threshold, the unit is duplicated (150.0 or 200.0)

FIG. 0 – Matrix 1 in v.0 model.

The doubling process can occur, anyway with a given probability, only above a given visibility; probability and visibility threshold are in matrix 1, as in fig. 0.

² Using 1261, 1262 and 1263, referring to rows 0, 1 and 2 of matrix 1; these computational steps call internally the step 1260, which applies the step 1110 to a list of units (using the row displacement set by each one of the calling step, to inspect the memory matrix).

Computational operations with code -1110 (a code for the jES Open Foundation extension): this computational code creates a copy of the unit the order is in, in the same (x, y) place of the copied unit, but in another model stratum, with the probability set in position 0,0 of the unique received matrix; the created unit is set in the stratum indicated in position 0,1 of the unique received matrix; the unit is created, with the above probability, if the content of the unit memory matrix in position 0,0 is positive (the actual position of this information within the memory matrix of the unit can be modified via the calling step, e.g. 1210 in tutorial step3c; here it is effectively displaced of one column); in our case, the 1260 CS places a 1 value in the unit memory matrix in the given position only if the unit visibility is $>$ then the threshold value reported in col. 3 (the fourth) in each row of the unique received matrix.

If the destination position in the new stratum is occupied the new unit is not created, without any advice; the new unit is not created if the original one is in the destination stratum; the new unit has the same visibility of the old one; finally, the computational step changes the status to done.

The CS 1110 is not normally utilized directly but via a special computational step (i.e. 1260 here) setting the position and content of the cell (≤ 0 or > 0) indicated above; the memory matrix of the copied unit is shared among the original unit itself and its copies, avoiding the creation of new matrixes for the copies.

1260: to have units displaying on another stratum we use the computational step 1260 (a code for the workers_skills_firms_banks application), which acts via the 1110 code; this code, when received by one unit in a stratum via a recipe, acts vs. all the units of the same type (i.e., with the same production phase) in all strata (excluding those of the destination stratum), copying them on the destination stratum.

With the CSs 1261, 1262 and 1263 we apply the CS 1260 to the cases of the units type 1001, type 1002 and type 1003.

The acting probability is applied to each firm, not to the duplication process as a whole. The copy process duplicates the position of the units and its visibility value³; not the state of the unit about production, waiting list, inactivity cycles and unsent product list. The original unit and the duplicated one use the same unit memory matrix, so the hiring process is common an duplicated, such as the worker' utilization process. Each one of the two units can disappear due to inactivity or unsent quantity of products; in case of lack of working capability they disappear simultaneously.

We launch so three orders containing recipes 1261-3⁴ ordering to all the units with the same production phase of the unit receiving the order (we send one order to a unit implementing the phase 1001, one to a unit implementing the phase 1002 and one to a unit implementing the phase 1003) to display themselves on stratum 5 (remembering that the first stratum is numbered 0). It is absolutely not relevant which unit is receiving this order; when a unit receive it, the unit activate itself and all the similar units in all the strata, but that of the destination stratum expressed in the copying order.

³ Visibility can be slightly different, by the amount of a visibility increasing step: normally in the copied unit the visibility has just been increased executing the internal step1 of normal cycle of the simulation and it will be increased again completing the internal step1 also for the new created units; to avoid this difference we subtract an increasing step from the copied value; if that value has not been incremented, being the copied unit a "new born", the subtraction operation above mentioned introduces the slight error referred in this note.

⁴ Using 1261, 1262 and 1263, referring to rows 0, 1 and 2 of matrix 0; these computational steps call internally the step 1250, which apply the step 1110 to a list of units (using the row displacement set by each one of the calling step, to inspect the memory matrix).

Computational operations with code -1110 (a code for the jES Open Foundation extension): this computational code creates a copy of the unit the order is in, in the same (x, y) place of the copied unit, but in another model stratum, with the probability set in position 0,0 of the unique received matrix; the created unit is set in the stratum indicated in position 0,1 of the unique received matrix; the unit is created, with the above probability, if the content of the unit memory matrix in position 0,0 is positive (the actual position of this information within the memory matrix of the unit can be modified via the calling step, e.g. 1210 in tutorial step3c); if the destination position in the new stratum is occupied the new unit is not created, without any advice; the new unit is not created if the original one is in the destination stratum; the new unit has the same visibility of the old one; finally, the computational step changes the status to done.

The CS 1110 is not normally utilized directly but via a special computational step (i.e. 1250 here) setting the position and content of the cell (≤ 0 or > 0) indicated above; the memory matrix of the copied unit is shared among the original unit itself and its copies, avoiding the creation of new matrixes for the copies.

1250: to have units displaying on another stratum we use the computational step 1250 (a code for the workers_skills_firms application), which acts via the 1110 code; this code, when received by one unit in a stratum via a recipe, acts vs. all the units of the same type (i.e., with the same production phase) in all strata (excluding those of the destination stratum), copying them on the destination stratum.

With the CSs 1261, 1262 and 1263 we apply 1250 to the cases of the units type 1, type 2 and type3.

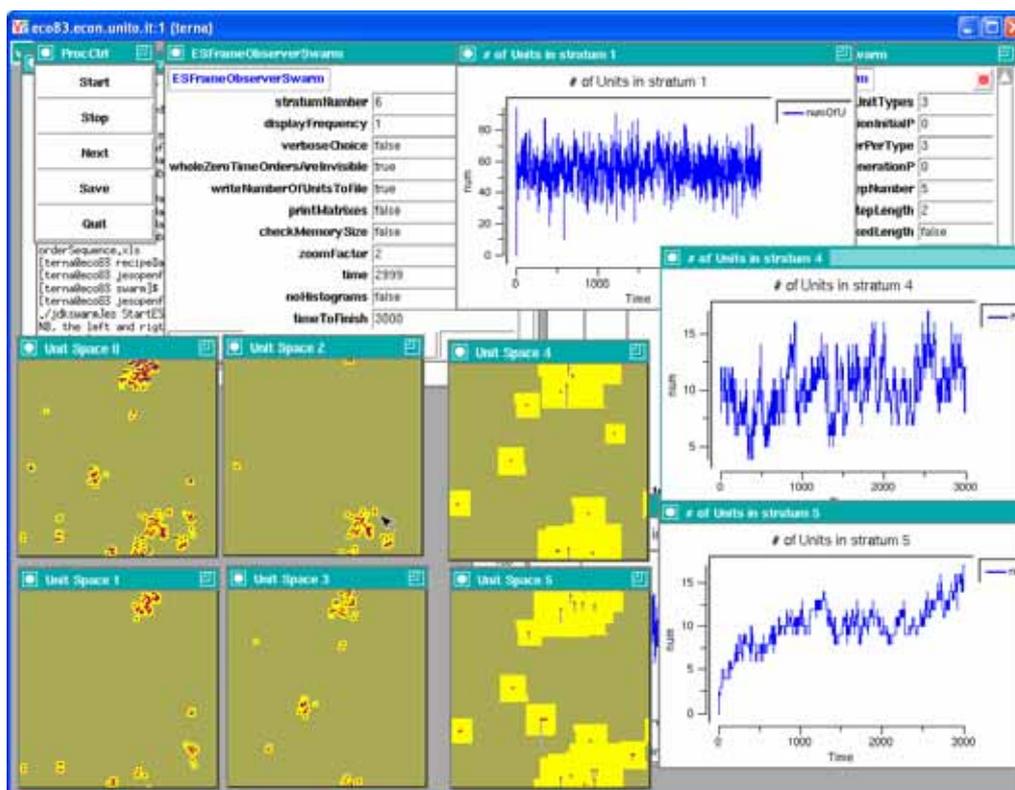


FIG. 1 – Version 0, with the correction eliminating the effects of the zero time whole order.

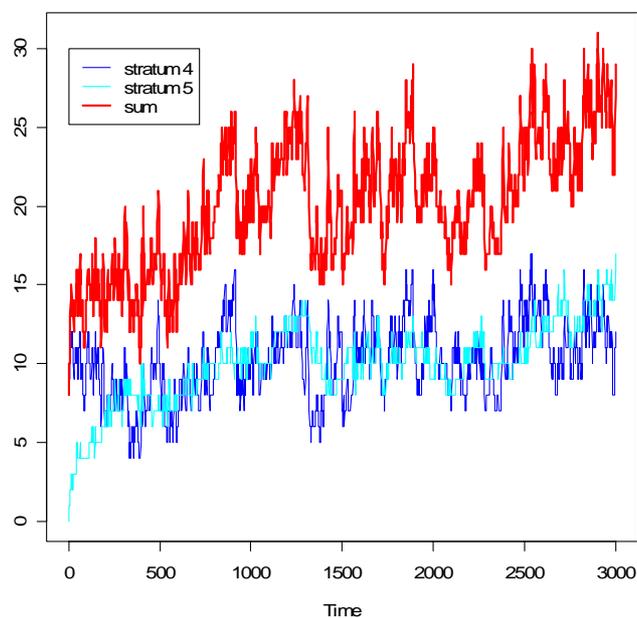


FIG. 2 – Version 0, with the correction eliminating the effects of the zero time whole order; the sum of strata 4 and 5

Looking at figs. 1 and 2, we recognize that this is a situation closely similar to that emerging in WSF v.1 (look at fig. 9b there) with stratum 5 firms determining large part of the dynamic of the system. In stratum 5 we have the doubled unit-firms, named conventionally Corporations, being the stratum 4 unit-firms named Small and Medium Enterprises (SMEs).

3. THE MODEL v.1

The version 1 of the WSFB model is always derived from the version 1 of the WSF model, adding another new stratum: the seventh one, with banks.

The code number of the production phase banks deal with is unique: 10001.

3. THE INTERACTION BANKS-FIRMS

In the WSF model, firms hire workers assuring both their own activity and the survival of workers; here banks allow credit to firms and this process assures the activity both of banks and firms.

In `recipeData6/orderSequence.xls` we can verify that we launch now, at each tick, 10 orders containing the recipe number 10011 directed to firms with the first production phase (10001, i.e. banks): the orders then move to firms with a consistent production phase (1001), reproducing a sort of credit activity by sectors; the recipes move from the banks to the firms immediately (these are steps with zero time execution; a bank sees a firms if the visibility areas both of the bank and of the firm are overlapping at least by one square. We do the same for phase 1002 and 1003, using the orders containing the recipes number 10012 and 10013, 10 at each tick.

Via the 1220⁵ CS contained in the orders above (those with recipes 10011 or 10012 or 10013), we increase both the counter of the time cycles a firm has been financed⁶ (memory matrixes of the units-firms in position 0,0) and the counter of firms the unit-firm has financed, each per one time cycle (memory matrixes of the units-banks in position 0,0).

addendum for position 0,0 (plus the a0, b0 displacements) of the memory matrix of the unit the order is in (the worker) (1.0)	addendum for position 0,0 (plus the a1, b1 displacements) of the memory matrix of the unit the order come from (the firm) (1.0)	a0 (0.0)	b0 (0.0)	a1 (0.0)	b1 (0.0)
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FIG. 3 – Matrix 1 in v.1 model, a fifth row.

Both firms and banks can accumulate more than one unit of financial-step per time cycle or tick (the firm is over-financed and the bank is over-financing firms). Firms always accept funds.

The fifth⁷ row line of the Matrix 1, shown in fig. 3, has 6 columns (cols from 4th to 6th are empty in the preceding rows) and contains the addenda to be used to increase the contents of the above mentioned matrixes both of the unit-firms (if financed) and of the units-bank if acting in financing.

⁵ The 1220 computational step uses the 1120 one, modifying the coordinates of the memory matrixes where to apply the addenda, both in the unit the order is in and in the unit the order comes from. In this case the displacement in the memory matrixes is zero, but as a trace for future modifications, this feature is fully developed. The four coordinates (two for the memory matrix of the unit the order is in and two for the unit the order comes from, are in positions 0,2; 0,3; 0,4, 0,5 of the second received matrix

⁶ Funding activity in considered as a sequence of financing steps; funding a firm for 100 cycles of activity is here obtained via 100 unitary financing acts, one per cycle.

⁷ We have here an empty rows in matrix 1 (the forth one), but this situation is accepted to avoid the creation of a new CS, similar to the 1220 one, but referred to another matrix row (in 1220 we have rd=4 row displacement).

Now we manage consumption of financing-endowments, obtained as financing-steps per cycle, for the units-firms and financial capability utilization for the unit-banks (in terms of unit of financial-endowments “employed” in each cycle).

The operation is done via the 1297 and 1299 CSs (codes for the workers-skills.-firms model), to decrease position 0,0 of the memory matrix of each unit-firm or bank by the content of position 0,5 of the second matrix and dropping the unit if the content of 0,0 is less than of the threshold in position 0,2 of the second matrix; the usual trick of $rd=k$ is used here.

probability of the correction (of the value whose id are in cols. 3 and 4 here) and, if necessary, of unit dropping (1.0)	count of dropped units (0.0)	dropping if the value in row, col. of unit memory matrix is less than the threshold set here (-30.0)	Row of the memory matrix we refer to (0.0)	col. of the memory matrix we refer to (0.0)	value to be added to the row, col. position of unit memory matrix (-1.0)
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FIG. 4 – Matrix 1 in v.1 model, a sixth row, for unit-firms in stratum 4 or 5.

The CS 1297 are applied to units doing phase 1001 or 1002 or 1003 (firms) via the orders containing the recipes 10021, 10022 and 10023. We launch only a copy of each order, due to the way the internally recalled CS 1199⁸ acts, propagating the order to all the units able in doing the same production phase. We are referring here to the sixth row of the matrix 1, as reported in fig. 4, so firms are dropped when their accumulation of financial-endowments at a specific cycle falls under -30.0, being the accumulation value diminished of 1.0 in each cycle and increased of the same amount for each positive financial action (remember that more than one hiring event can occur in each cycle).

probability of the correction (of the value whose id are in cols. 3 and 4 here) and, if necessary, of unit dropping (1.0)	count of dropped units (0.0)	dropping if the value in row, col. of unit memory matrix is less than the threshold set here (-60.0)	Row of the memory matrix we refer to (0.0)	col. of the memory matrix we refer to (0.0)	value to be added to the row, col. position of unit memory matrix (-1.0)
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FIG. 5 – Matrix 1 in v.1 model, a eighth row, for unit-banks in stratum 6.

The CS 1299 is applied to units doing phase 10001 (banks) via the orders containing the recipes 10041. We launch only a copy of the order, as above. We are referring here to the eighth row of the matrix 1, as reported in fig. 5⁹, so banks are dropped when their accumulation of employed financial capabilities in doses of unit-cycle falls under -60.0, being the accumulation value diminished of 1.0 in each cycle and increased of the same amount for each hiring event (remember that more than one financial employment event can occur in each cycle).

⁸ 1199 – this highly usable computational code, when received by one unit in a stratum, acts vs. all the units of the same type (i.e., with the same production phase) in all strata; actions: with the probability set in position 0,0 of the first received matrix, 1999 adds the value contained in 0,5 of the second received matrix to each unit memory matrix a row and column reported in pos 0,3 and 0,4 of the second matrix; if the resulting content is less than the threshold contained in position 0,2 of the second matrix, the considered unit is dropped (if it is the unit the order is in, also the order is dropped), counting the dropped units in position 0,1 of the second matrix (obviously, first and second matrixes can be coincident).

⁹ We leave again a row as emp-

4. RESULTS

Remember that banks are lending to firms of strata 4 and 5 in an undifferentiated way. In stratum 5 we have the doubled unit-firms, named conventionally Corporations, being the stratum 4 unit-firms named Small and Medium Enterprises (SMEs).

4.1 NEW BANKS ENTER THE WORLD (IN AVERAGE, ONE PER 5 YEARS OR 200 CYCLES)

In figs. 6 and 7 we have now banks conditioning the survival of firms, but in a light way, existing here a lot of banks; in the middle of the first block of 1,000 or 25 years (look at WSF model to verify this time quantification), about at year 12, we have a financial crisis with firms disappearing from the world; the crisis is solved also because new banks enter in the simulation, financing firms..

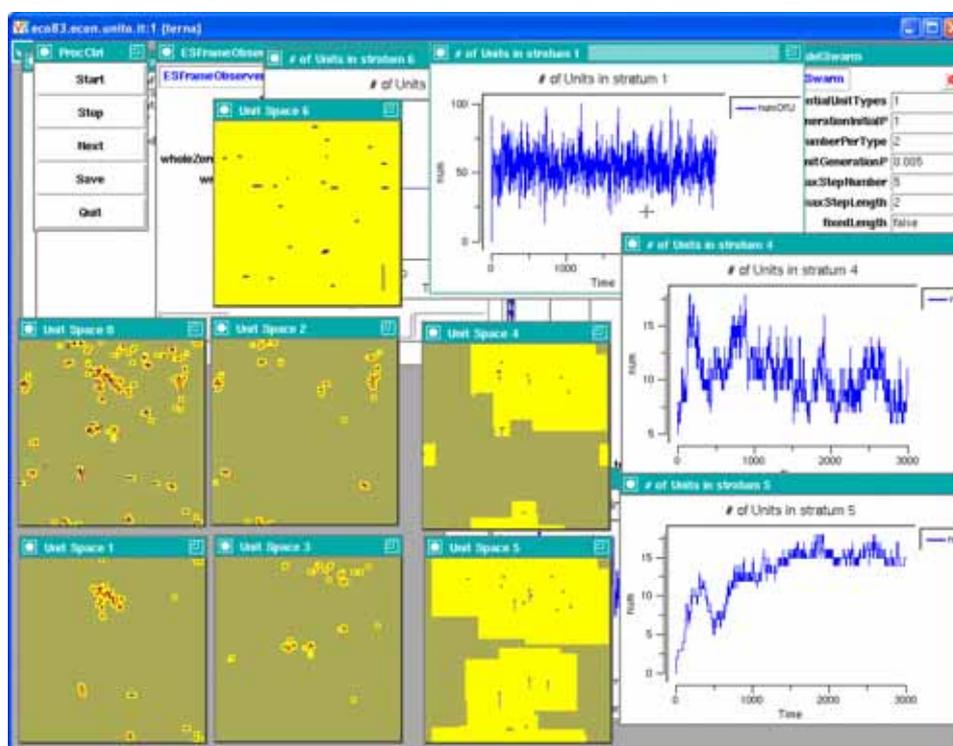


FIG. 6 – Version 1, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.005$.

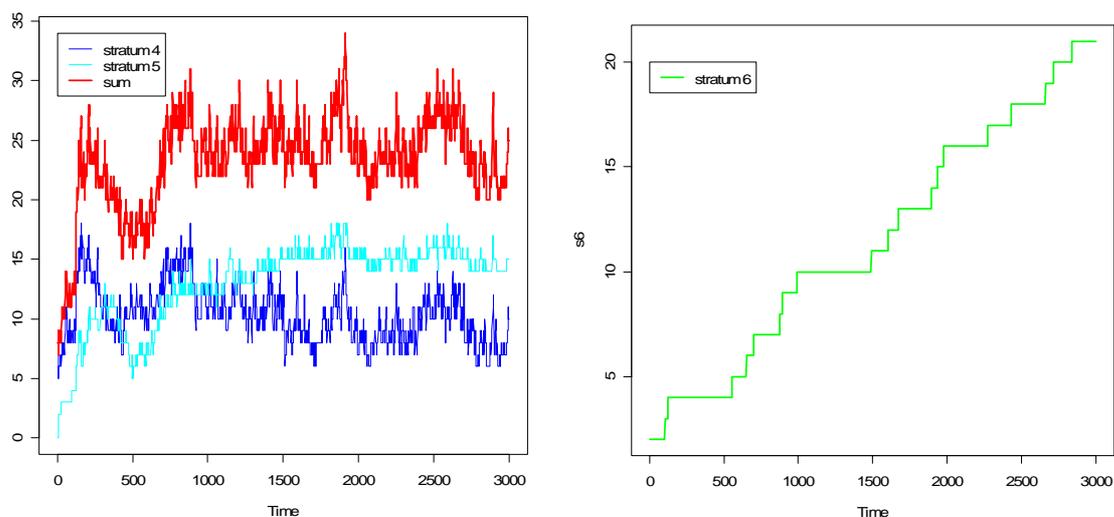


FIG. 7 – Version 1, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.005$. Summing up firms and counting banks.

4.2 NEW BANKS MODERATELY ENTER THE WORLD (IN AVERAGE, ONE PER 25 YEARS)

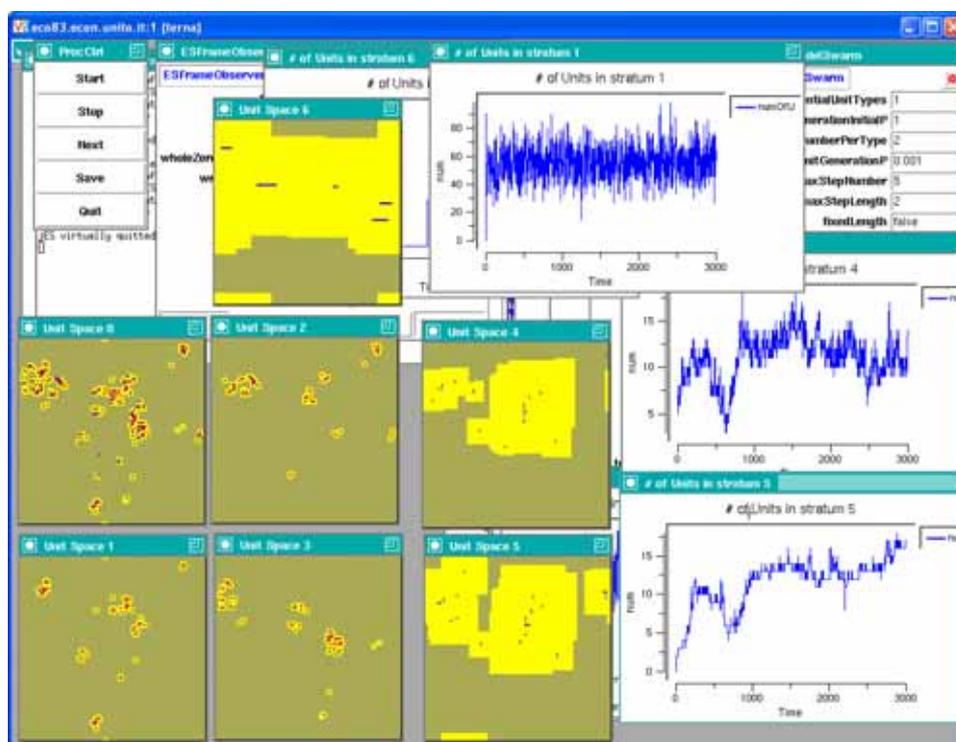


FIG. 8 – Version 1, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -60

In figs. 8 and 9 the presence of banks is constrained; global behavior is close to the previous one (4.1). Credit lending has a 0.5 probability both for Corporations and SMEs; the survival time for idle banks is 60 cycles.

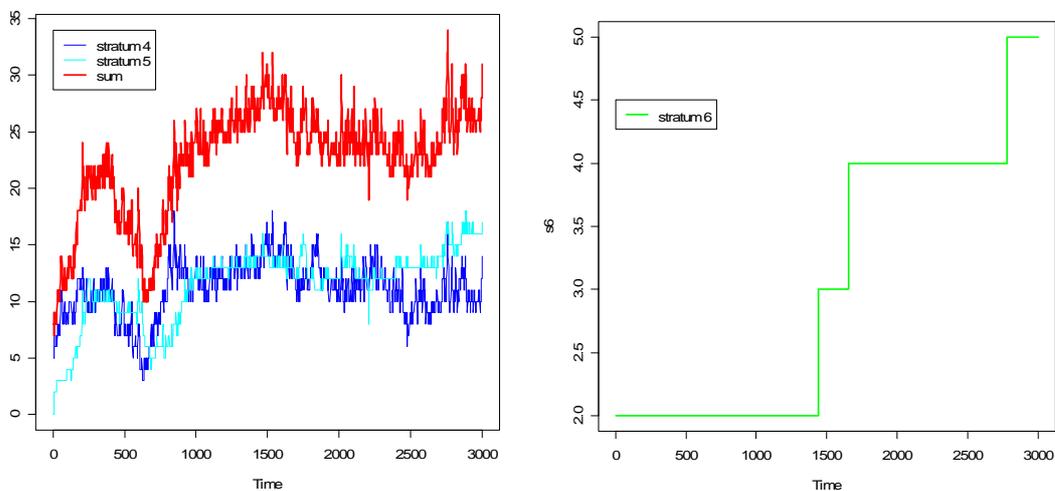


FIG. 9 – Version 1, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -60 . Summing up firms and counting banks.

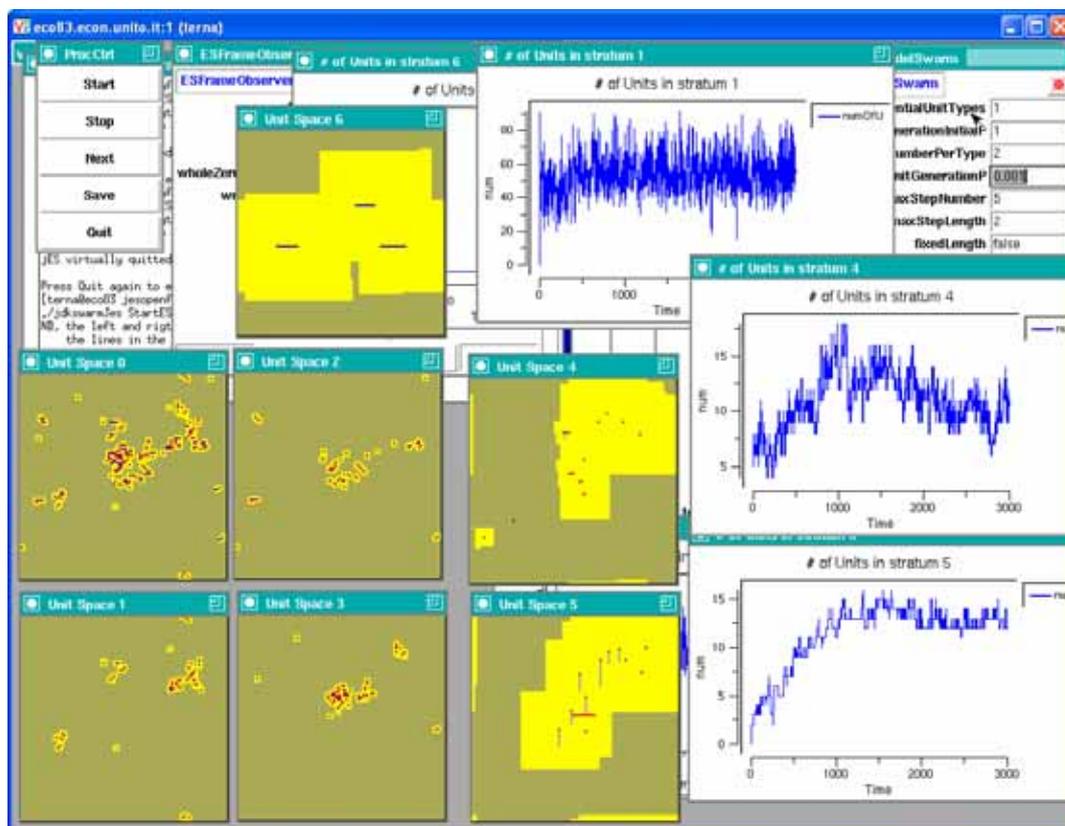


FIG. 10 – Version 1, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -30

In figs. 10 and 11 the presence of banks is constrained; global behavior is close to the previous one (4.1). Credit lending has a 0.5 probability both for Corporations and SMEs; the survival time for idle banks is 30 cycles.

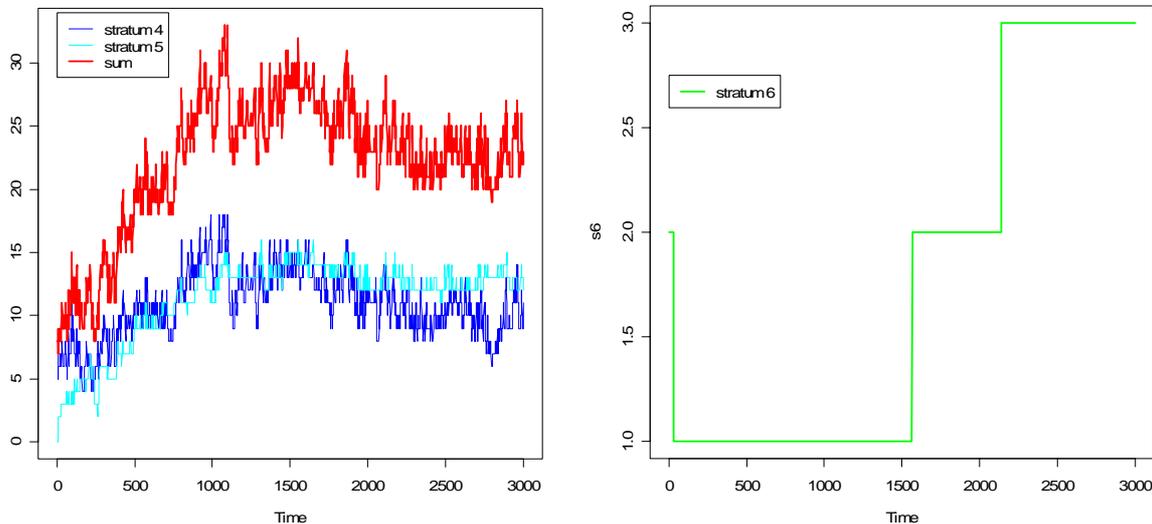


FIG. 11 – Version 1, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -30 , Summing up firms and counting banks.

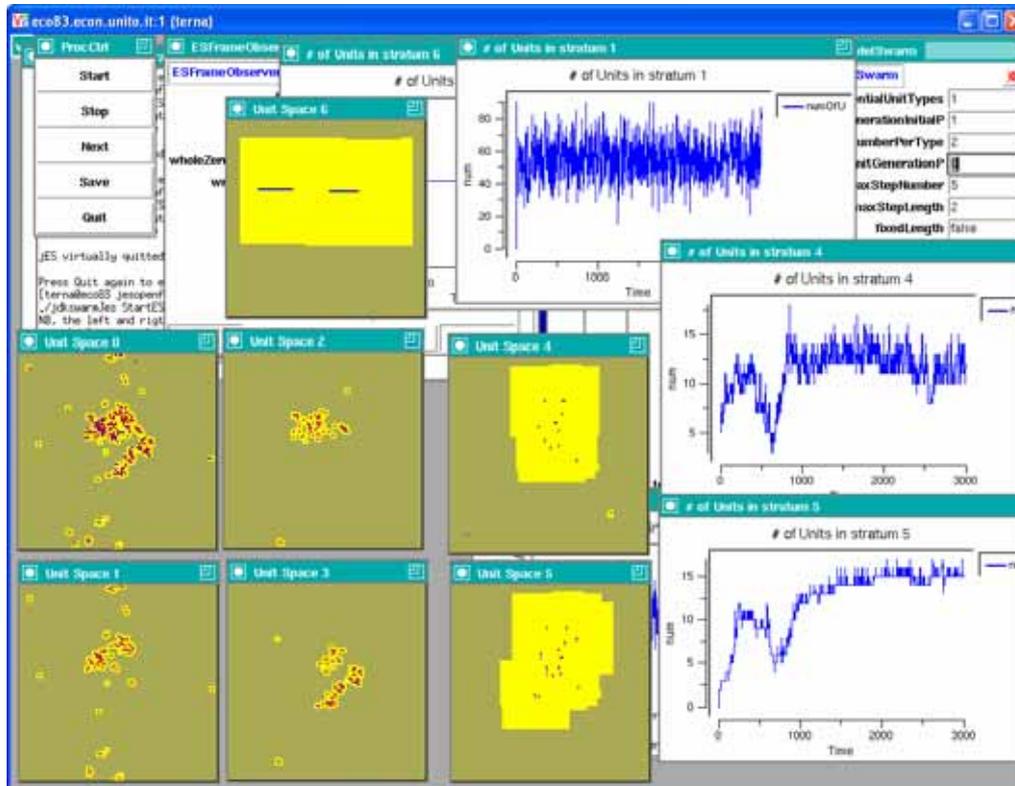


FIG. 12 – Version 1, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0$; dropped if credit allowances < -60

In figs. 12 and 13 the presence of banks is hardly constrained, with $p=0$ probability of creation; global behavior is close to the previous one (4.1). Credit lending has a 0.5 probability both for Corporations and SMEs; the survival time for idle banks is 60 cycles.

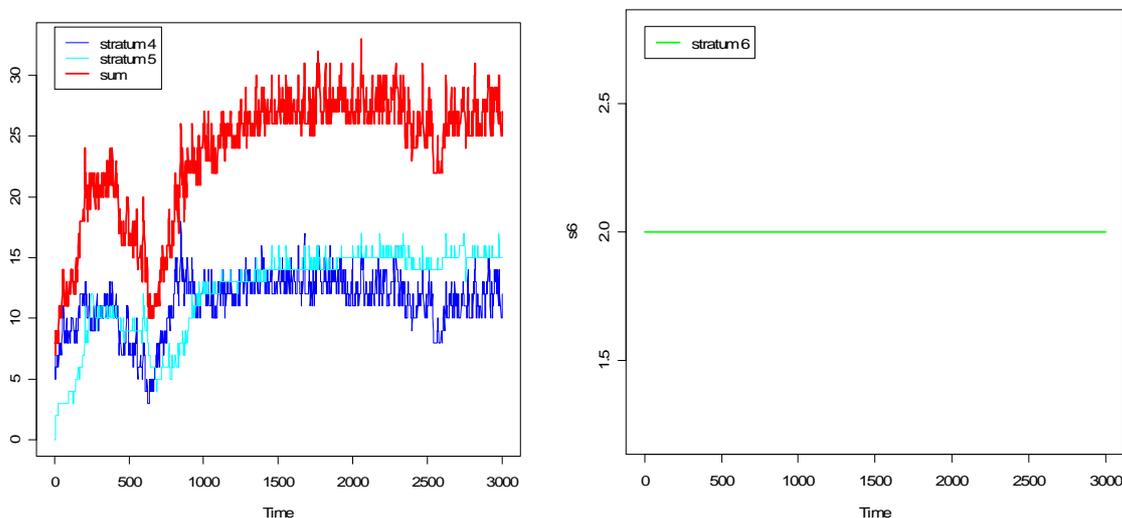


FIG. 13 – Version 1, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0$; dropped if credit allowances < -60 . Summing up firms and counting banks.

5. THE MODEL v.2

The version 2 of the WSFB model is derived from the version 1 of the WSFB model, adding new recipes and a new matrix.

The new recipes are alternative to the 1220 one, diversifying the probability (always 1 in CS 1220) of activation of the double adding operation and explicitly indicating the stratum in which both the operations act. The stratum is identified by the unit the order with this recipe is in.

6. THE NEW WAY OF INTERACTION BANKS-FIRMS

In `recipeData6/orderSequence.xls` we can verify that we launch now, at each tick, 10 orders containing the recipe number 100011 directed to firms with the first production phase (10001, i.e. banks): the orders then move to firms with a consistent production phase (1001), reproducing a sort of credit activity by sectors; the recipes move from the banks to the firms immediately (these are steps with zero time execution; a bank sees a firms if the visibility areas both of the bank and of the firm are overlapping at least by one square. We do the same for phase 1002 and 1003, using the orders containing the recipes number 100012 and 100013, 10 at each tick. The 10+10+10 launched order are related to stratum 4; other 10+10+10 are related to stratum 5; being those orders execute with $p = 0.5$, the mean total value does not changes if compared with v.1.

Anyway we can here modify the strata financial activity, for example with $p = 0.25$ for stratum 4 and 0.75 for stratum 4 or vice versa.

Via the 1221 and 1222¹⁰ CS contained in the orders above (those with recipes 100011-100111 or 100012-100112 or 100013-100113), we increase both the counter of the time cycles a firm has been financed¹¹ (memory matrixes of the units-firms in position 0,0) and the counter of firms the unit-firm has financed, each per one time cycle (memory matrixes of the units-banks in position 0,0).

Addendum for position 0,0 (plus the a0, b0 displacements) of the memory matrix of the unit the order is in (the worker) (1.0)	addendum for position 0,0 (plus the a1, b1 displacements) of the memory matrix of the unit the order come from (the firm) (1.0)	a0 (0.0)	b0 (0.0)	a1 (0.0)	b1 (0.0)	Probability of activation (0.5 or .25 or .75 or .10 or .90)	Stratum where consider the destination unit (otherwise the action fails) (4)
Addendum for position 0,0 (plus the a0, b0 displacements) of the memory matrix of the unit the order is in (the worker) (1.0)	Addendum for position 0,0 (plus the a1, b1 displacements) of the memory matrix of the unit the order come from (the firm) (1.0)	a0 (0.0)	b0 (0.0)	a1 (0.0)	b1 (0.0)	Probability of activation (0.5 or 0.75 or 0.25 or .90 or .10)	Stratum where consider the destination unit (otherwise the action fails) (5)

FIG. 14 – Matrix 2 in v.2 model, first and second rows.

¹⁰ The 1220 computational step uses the 1120 one, modifying the coordinates of the memory matrixes where to apply the addenda, both in the unit the order is in and in the unit the order comes from. In this case the displacement in the memory matrixes is zero, but as a trace for future modifications, this feature is fully developed. The four coordinates (two for the memory matrix of the unit the order is in and two or the unit the order comes from, are in positions 0,2; 0,3; 0,4, 0,5 of the second received matrix

¹¹ Funding activity is considered as a sequence of financing steps; funding a firm for 100 cycles of activity is here obtained via 100 unitary financing acts, one per cycle.

6.1 CREDIT LENDING 0.5 TO SMEs AND 0.5 TO CORPORATIONS.

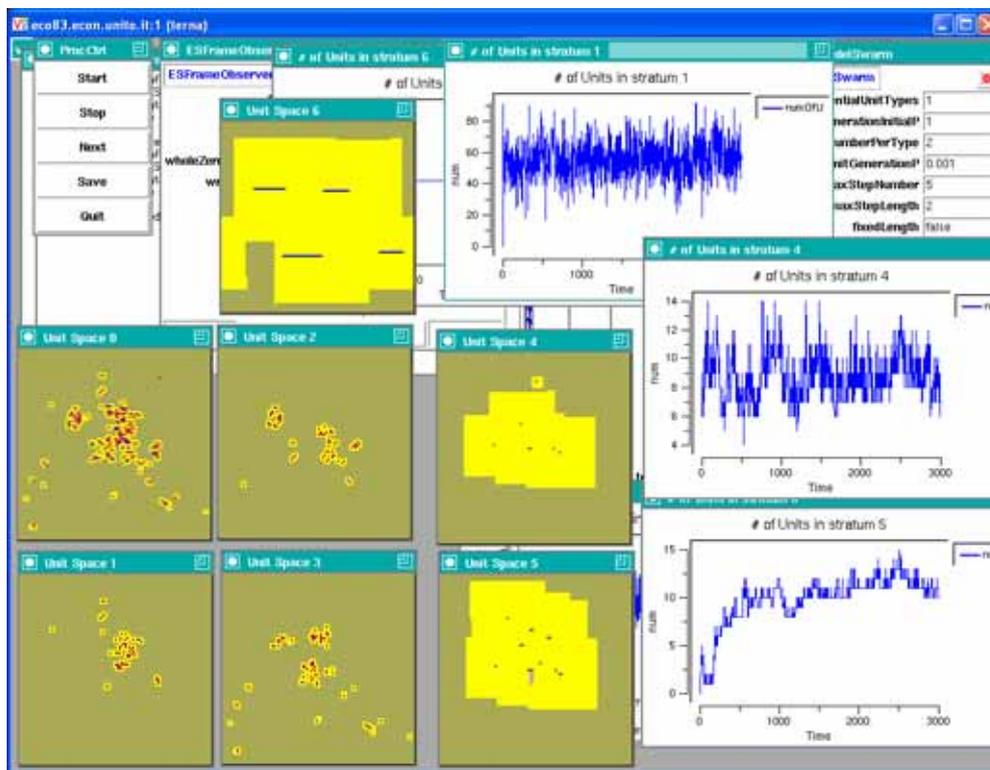


FIG. 15 – Version 2, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -60 . The probability of credit allowances is 0.5 in stratum 4 (SMEs) and 0.5 in stratum 5 (big companies).

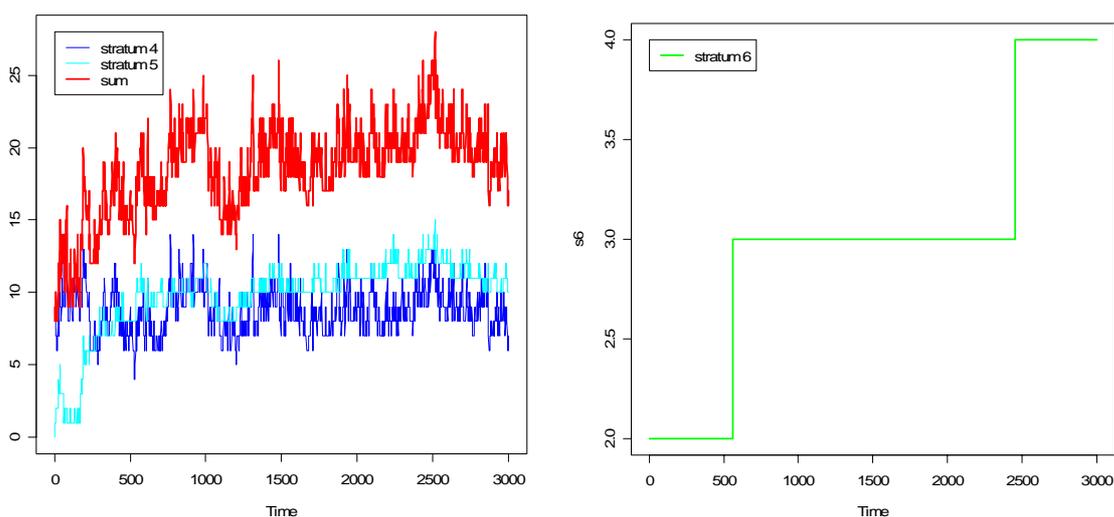


FIG. 16 – Version 2, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -60 . The probability of credit allowances is 0.5 in stratum 4 (SMEs) and 0.5 in stratum 5 (big companies). Summing up firms and counting banks.

Equilibrated global behavior.

6.2 CREDIT LENDING 0.75 TO SMEs AND 0.25 TO CORPORATIONS.

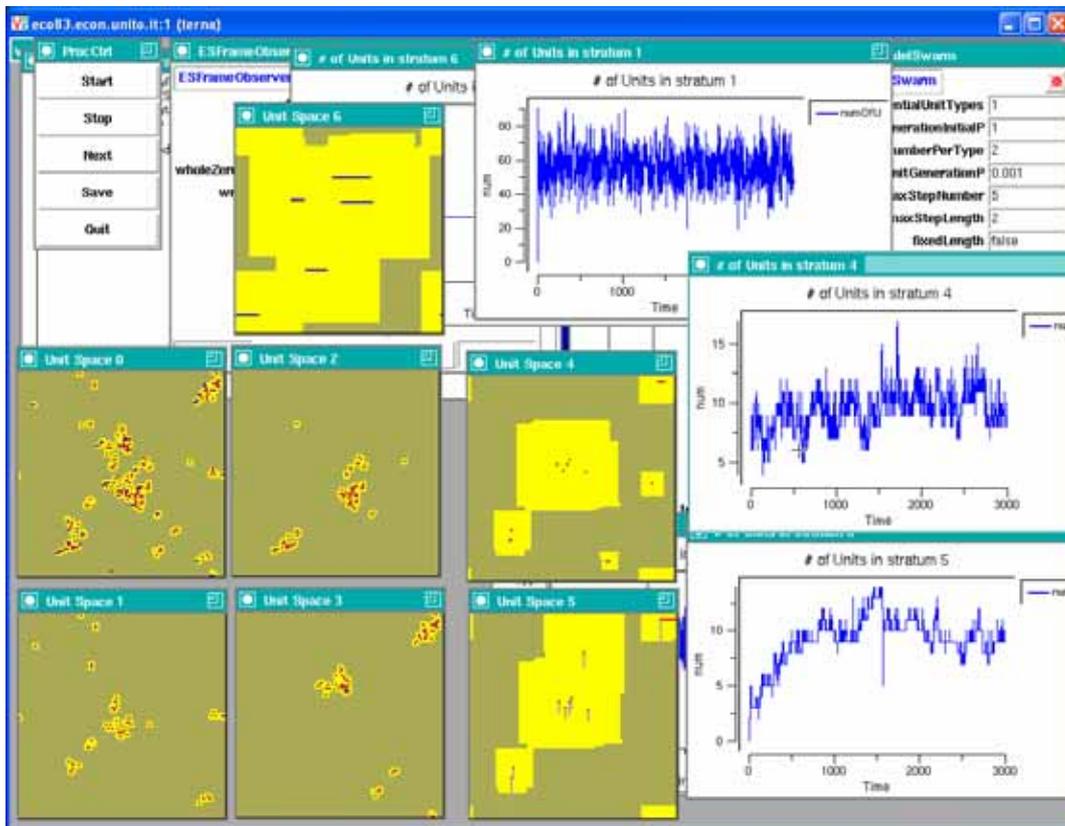


FIG. 17 – Version 2, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -60 . The probability of credit allowances is 0.75 in stratum 4 (SMEs) and 0.25 in stratum 5 (big companies).

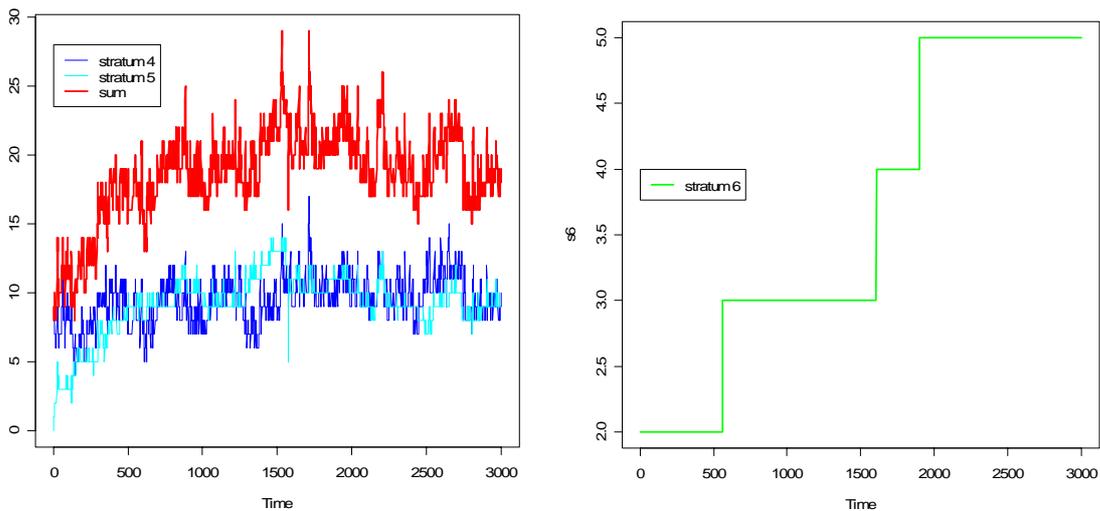


FIG. 18 – Version 2, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -60 . The probability of credit allowances is 0.75 in stratum 4 (SMEs) and 0.25 in stratum 5 (big companies). Summing up firms and counting banks.

Global advantage lending mainly to SMEs (look always at the red line).

6.3 CREDIT LENDING 0.90 TO SMEs AND 0.10 TO CORPORATIONS.

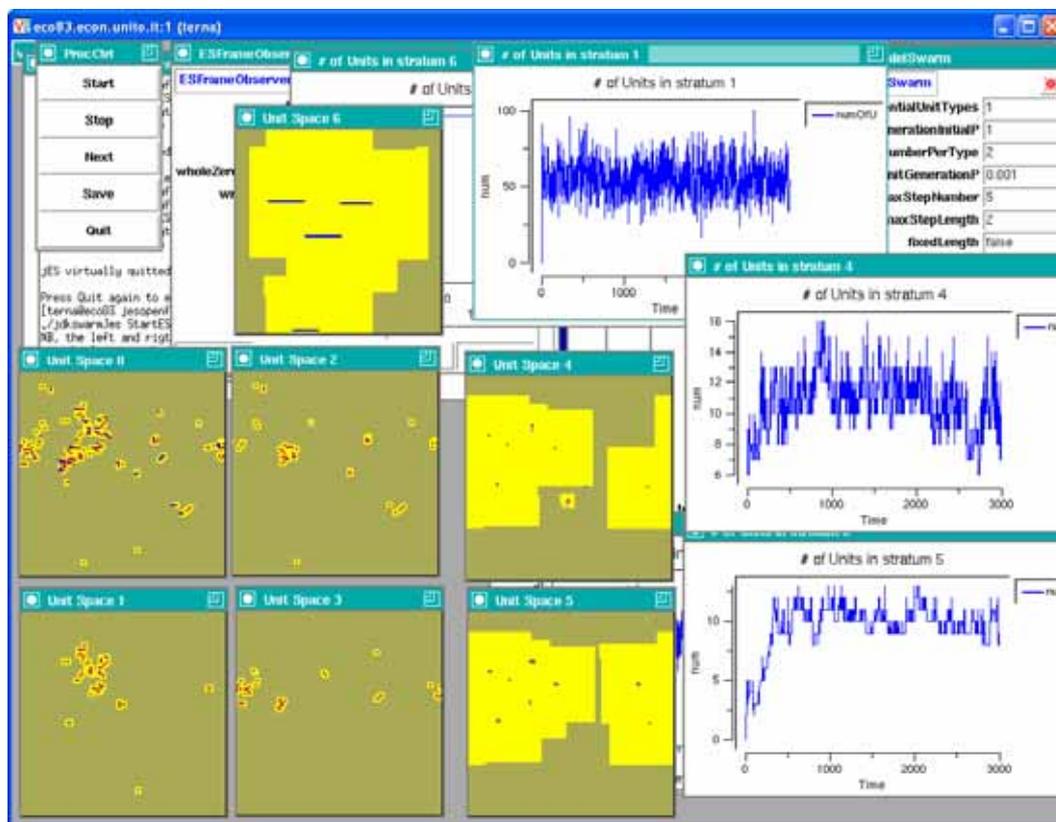


FIG. 19 – Version 2, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -60 . The probability of credit allowances is 0.90 in stratum 4 (SMEs) and 0.10 in stratum 5 (big companies).

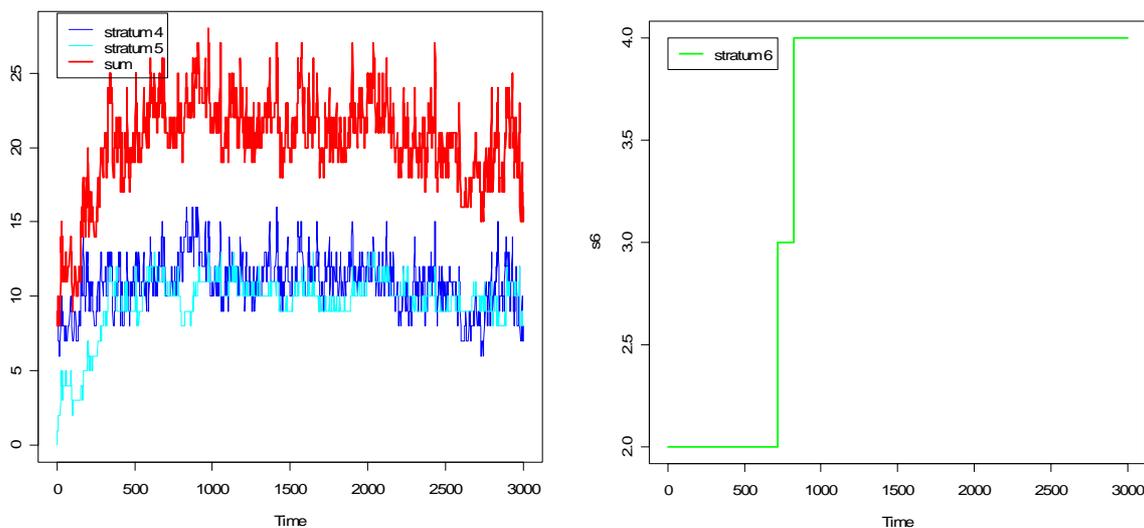


FIG. 20 – Version 2, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -60 . The probability of credit allowances is 0.90 in stratum 4 (SMEs) and 0.10 in stratum 5 (big companies). Summing up firms and counting banks.

Global greater advantages.

6.4 CREDIT LENDING 0.90 TO SMEs AND 0.10 TO CORPORATIONS, DOUBLING FIRMS IF THEIR VISIBILITY IS > 200 (NORMALLY 150).

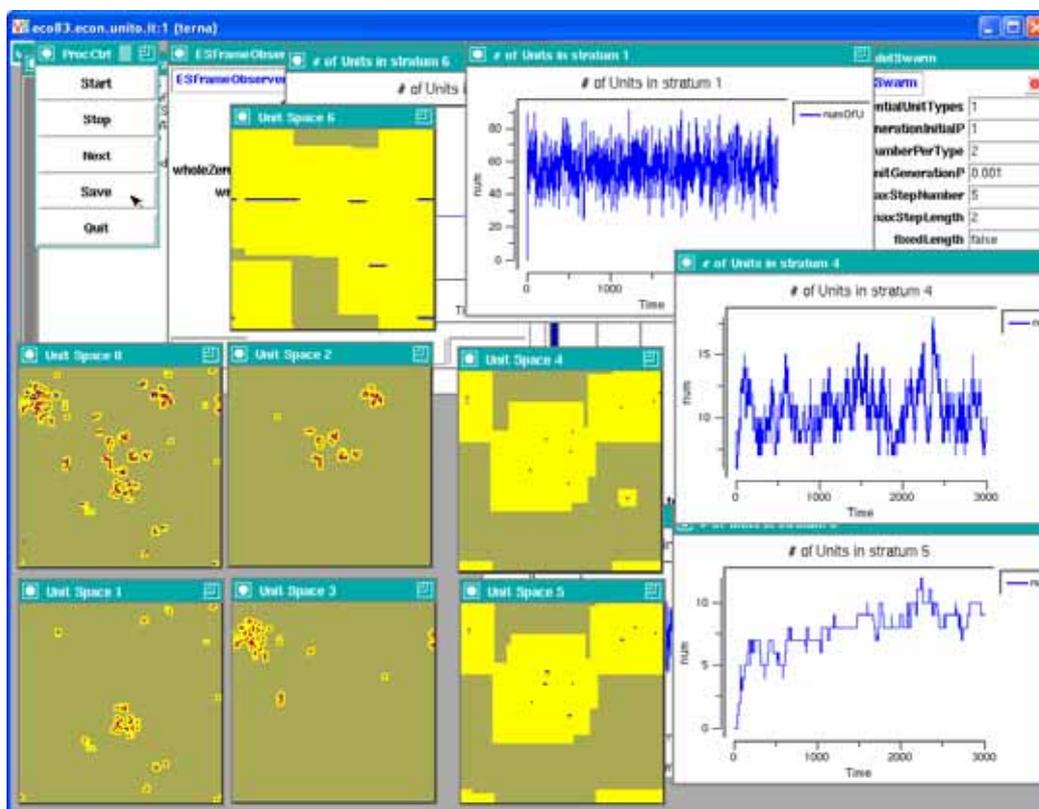


FIG. 21 – Version 2, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -60 . The probability of credit allowances is 0.90 in stratum 4 (SMEs) and 0.10 in stratum 5 (big companies), with the threshold for doubling enterprises moved to 200.

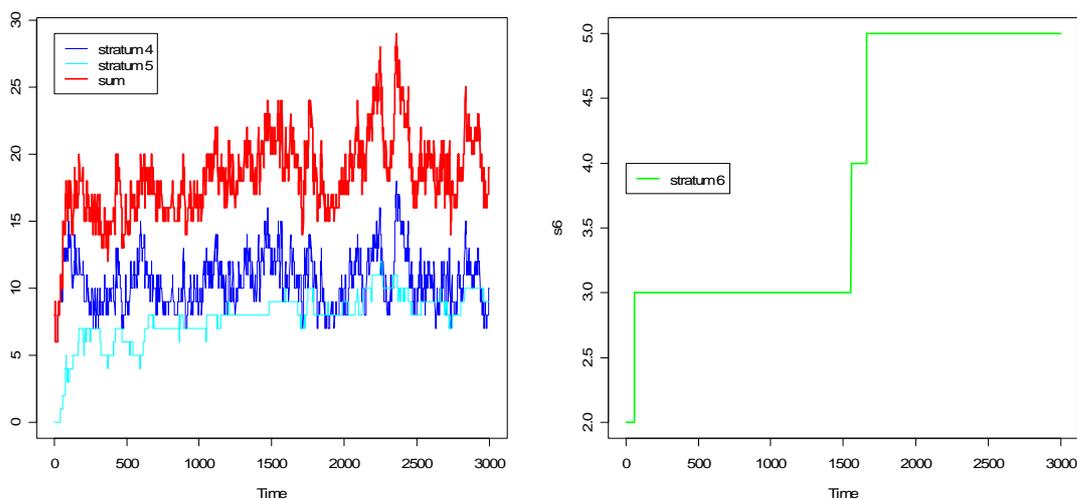


FIG. 22 – Version 2, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -60 . The probability of credit allowances is 0.90 in stratum 4 (SMEs) and 0.10 in stratum 5 (big companies), with the threshold for doubling enterprises moved to 200. Summing up firms and counting banks.

NB, the key figs. 21, 22, 27 and 28 have been added after the closure of the Siena slides, wiva3_terna_presentazione.ppt.

Evaluating comparatively figs. 21-22 and 27-28 we have a clear picture of the different consequences adopting post-Basel II strategies supporting SMEs (here) or Corporations (below).

6.5 CREDIT LENDING 0.25 TO SMEs AND 0.75 TO CORPORATIONS.

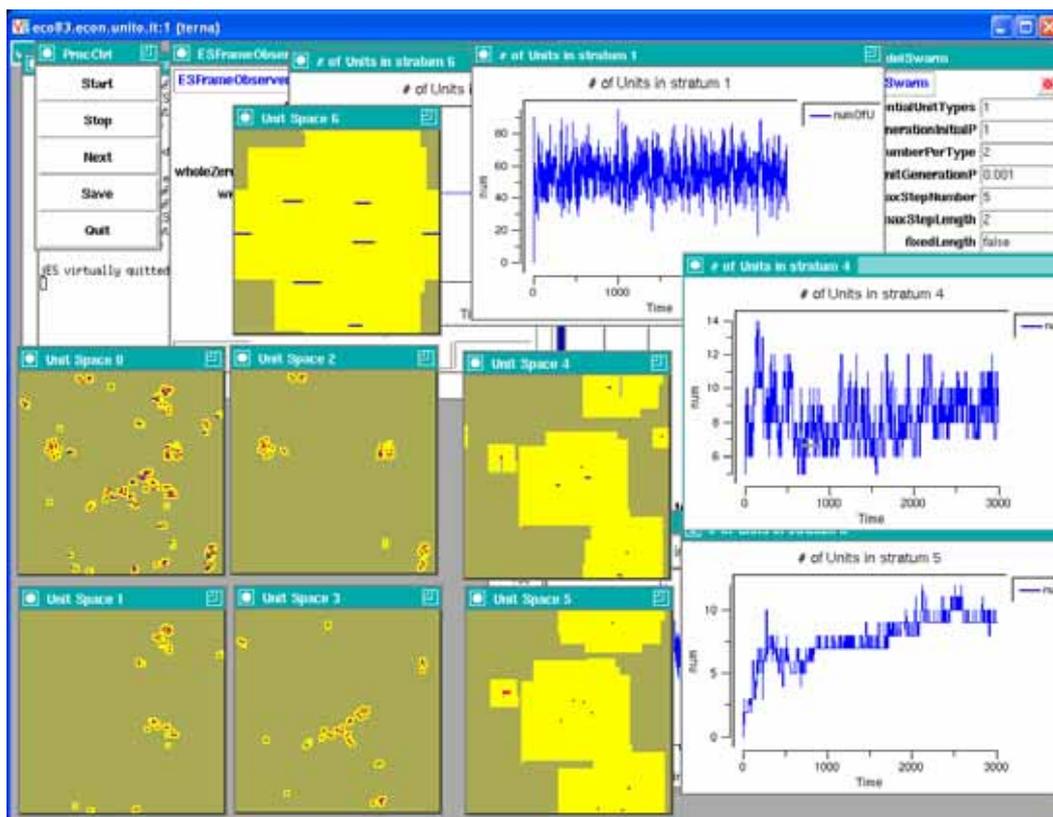


FIG. 23 – Version 2, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -60 . The probability of credit allowances is 0.25 in stratum 4 (SMEs) and 0.75 in stratum 5 (big companies).

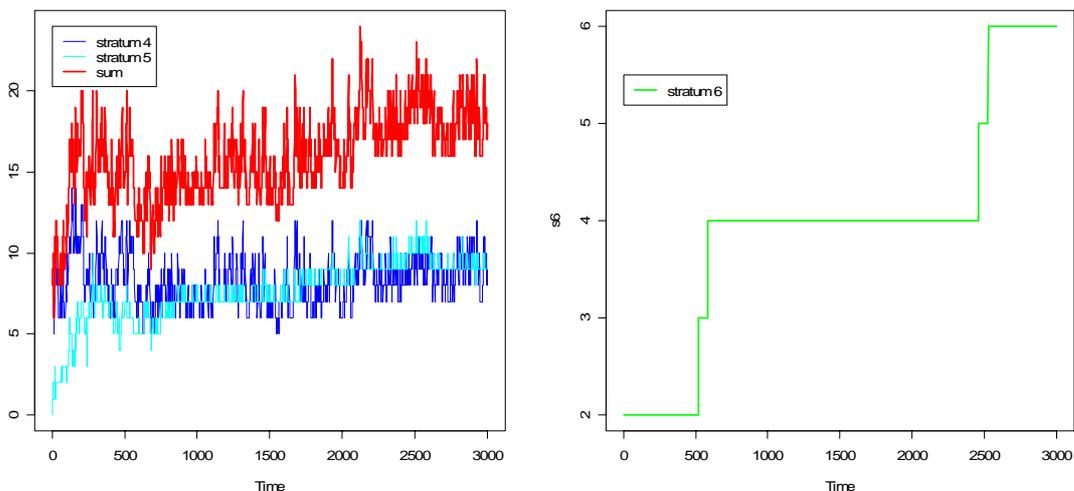


FIG. 24 – Version 2, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -60 . The probability of credit allowances is 0.25 in stratum 4 (SMEs) and 0.75 in stratum 5 (big companies). Summing up firms and counting banks.

Slow and limited dynamic.

6.6 CREDIT LENDING 0.10 TO SMEs AND 0.90 TO CORPORATIONS.

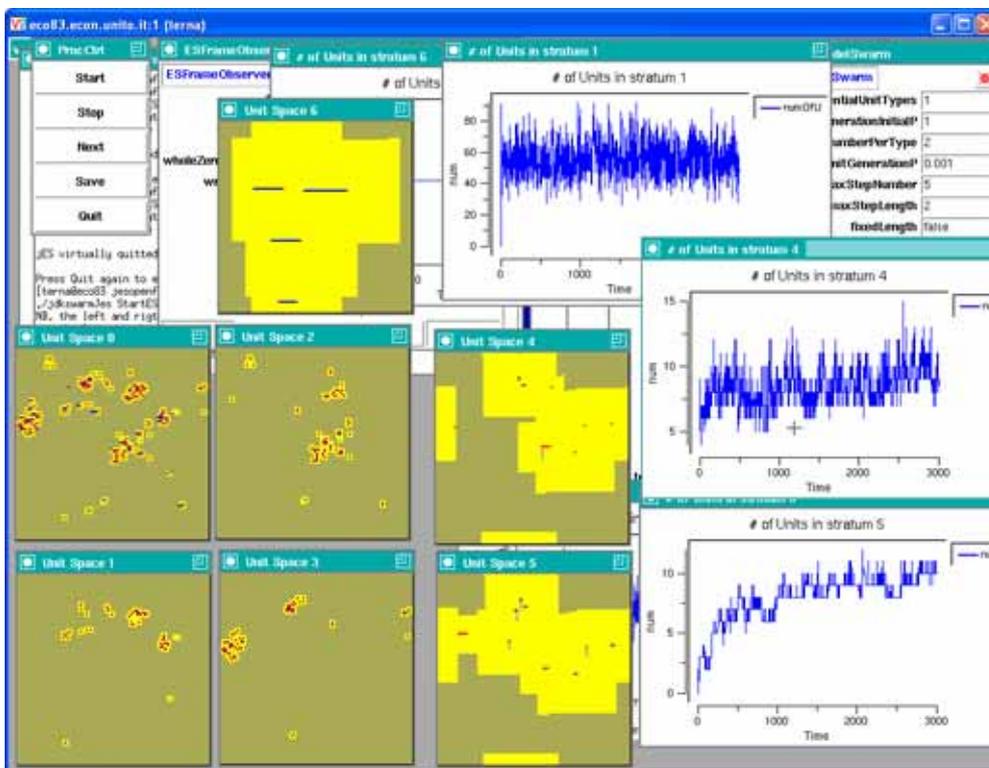


FIG. 25 – Version 2, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -60 . The probability of credit allowances is 0.10 in stratum 4 (SMEs) and 0.90 in stratum 5 (big companies).

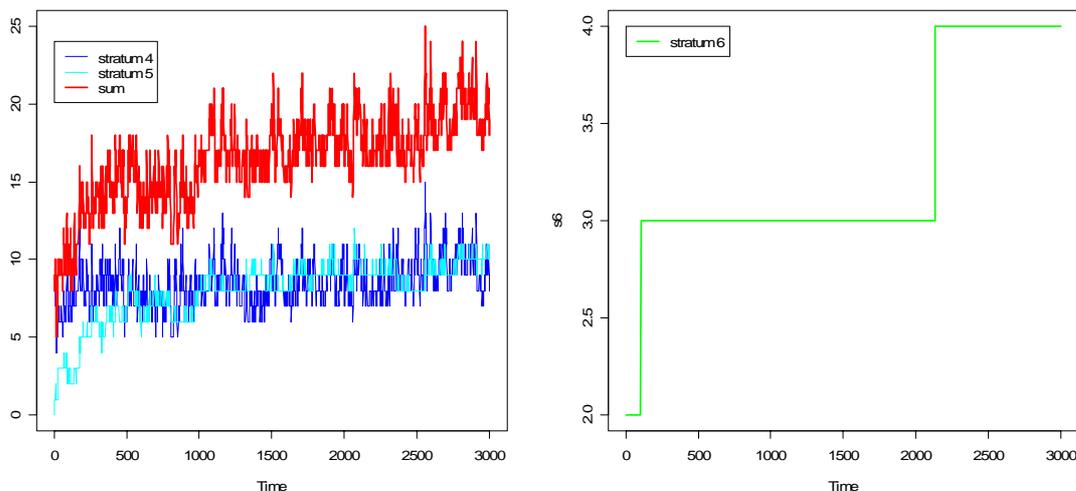


FIG. 26 – Version 2, new workers with skills equal to that of their neighbors, with `wholeZeroTimeOrdersAreInvisible = true`. Bank natality $p = 0.001$; dropped if credit allowances < -60 . The probability of credit allowances is 0.10 in stratum 4 (SMEs) and 0.90 in stratum 5 (big companies). Summing up firms and counting banks.

Compare the max value of the read line here in fig. 26 (near 25) with that of the similar line in fig. 20 (near 28, but with a systematic positive difference) to discover the whole negative effect of a wrong application of Basel II agreement¹², lending only to corporations.

¹² Bank for International Settlements, Basel II: Revised international capital framework:

- The efforts of the Basel Committee on Banking Supervision to revise the standards governing the capital adequacy of internationally active banks achieved a critical milestone in the publication of an agreed text in June 2004.
- The Basel II Framework describes a more comprehensive measure and minimum standard for capital adequacy that national supervisory authorities are now working to implement through domestic rule-making and adoption procedures. It seeks to improve on the existing rules by aligning regulatory capital requirements more closely to the underlying risks that banks face.

From <http://www.bis.org/publ/bcbsca.htm>

6.7 CREDIT LENDING 0.10 TO SMEs AND 0.90 TO CORPORATIONS, DOUBLING FIRMS IF THEIR VISIBILITY IS > 200 (NORMALLY 150).

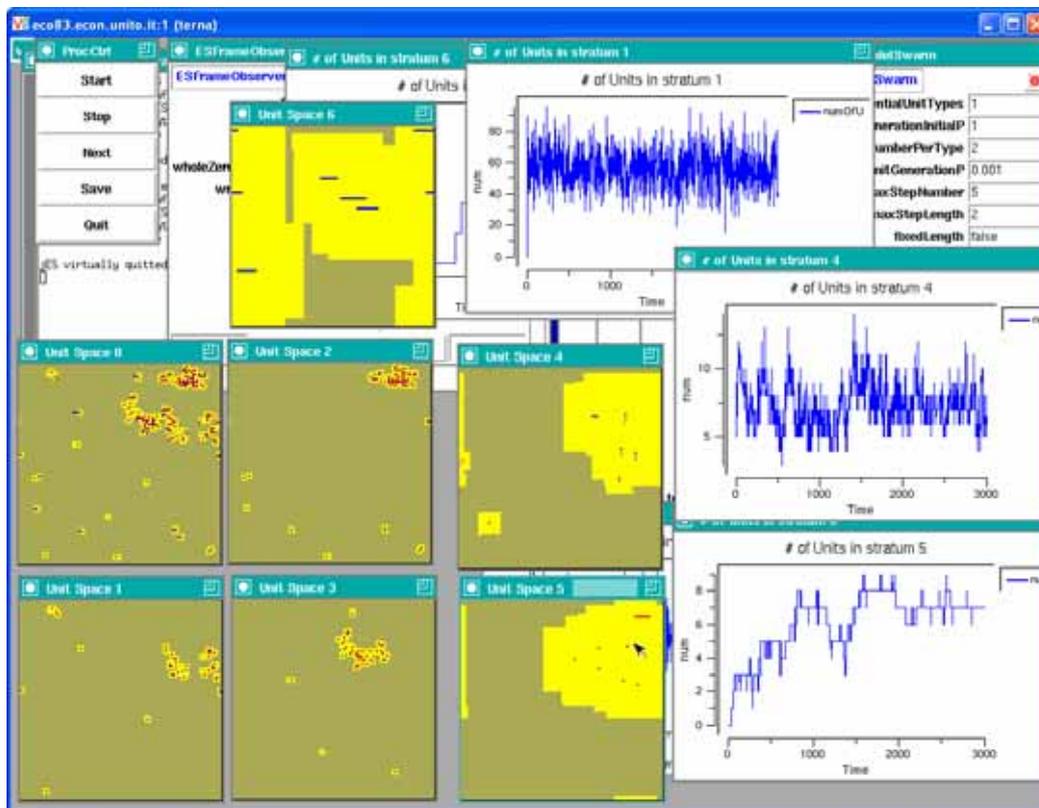


FIG. 27 – Version 2, new workers with skills equal to that of their neighbors, with wholeZeroTimeOrdersAreInvisible = true. Bank natality $p = 0.001$; dropped if credit allowances < -60 . The probability of credit allowances is 0.10 in stratum 4 (SMEs) and 0.90 in stratum 5 (big companies), with the threshold for doubling enterprises moved to 200.

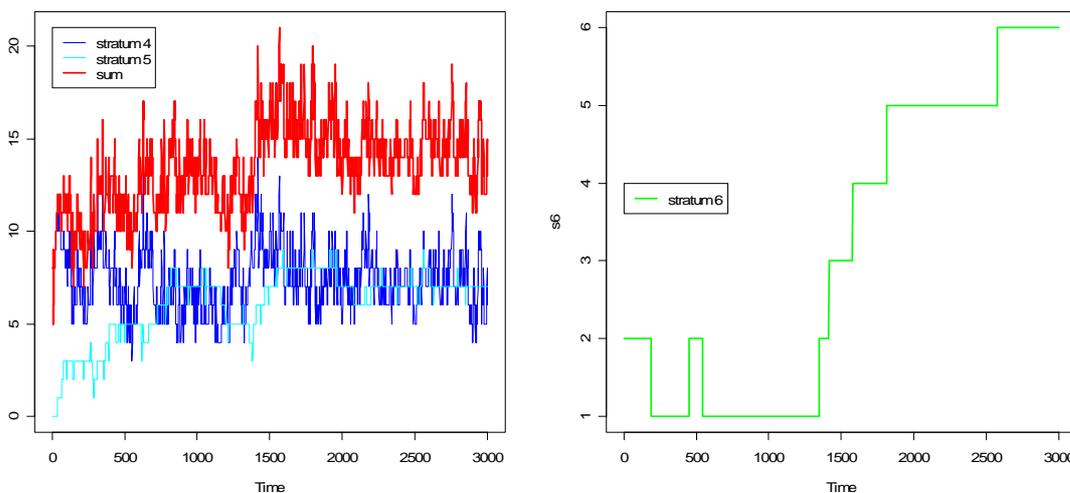


FIG. 28 – Version 2, new workers with skills equal to that of their neighbors, with wholeZeroTimeOrdersAreInvisible = true. Bank natality $p = 0.001$; dropped if credit allowances < -60 . The probability of credit allowances is 0.10 in stratum 4 (SMEs) and 0.90 in stratum 5 (big companies), with the threshold for doubling enterprises moved to 200. Summing up firms and counting banks.

NB, the key figs. 21, 22, 27 and 28 have been added after the closure of the Siena slides, wiva3_terna_presentazione.ppt.

Compare the max value of the read line here in fig. 28 (near 30) with that of the similar line in fig. 22 (near 30) to confirm and amplify the whole negative effect of a wrong application of Basel II agreement, lending only to corporations. Here also banks suffer a severe initial crisis as an indirect consequence.