

# Eurace Reference Manual

Author names to add

November 30, 2009

## Contents

<b>1</b>	<b>Eurace FLAME Implementation</b>	<b>3</b>
1.1	Firm . . . . .	4
1.2	Household . . . . .	18
1.3	Mall . . . . .	27
1.4	IGFirm . . . . .	30
1.5	Eurostat . . . . .	34
1.6	Bank . . . . .	44
1.7	Government . . . . .	48
1.8	Central_Bank . . . . .	55
1.9	Clearinghouse . . . . .	59
1.10	Messages . . . . .	62
1.11	Constants . . . . .	77
1.12	Datatypes . . . . .	82

## List of Tables

1	List of memory variables for Firm agent. . . . .	5
2	List of functions for Firm agent. . . . .	12
3	List of memory variables for Household agent. . . . .	19
4	List of functions for Household agent. . . . .	24
5	List of memory variables for Mall agent. . . . .	28
6	List of functions for Mall agent. . . . .	29
7	List of memory variables for IGFirm agent. . . . .	31
8	List of functions for IGFirm agent. . . . .	33
9	List of memory variables for Eurostat agent. . . . .	35
10	List of functions for Eurostat agent. . . . .	43
11	List of memory variables for Bank agent. . . . .	45
12	List of functions for Bank agent. . . . .	47
13	List of memory variables for Government agent. . . . .	49
14	List of functions for Government agent. . . . .	53
15	List of memory variables for Central_Bank agent. . . . .	56
16	List of functions for Central_Bank agent. . . . .	58
17	List of memory variables for Clearinghouse agent. . . . .	60
18	List of functions for Clearinghouse agent. . . . .	61
19	List of messages. . . . .	63

20	<b>List of constants.</b> . . . . .	78
21	<b>List of attributes for ADTs.</b> . . . . .	83

## 1 Eurace FLAME Implementation

## 1.1 Firm

Table 1: **List of memory variables for Firm agent.**

Name	Description
int id	Agent ID.
int region_id	Region ID to which the agent is associated.
int gov_id	Government to which the agent is associated.
int day_of_month_to_act	Activation day.
int last_day_of_month_to_act	One day before the activation day.
double payment_account	Current account value.
int bank_id	Bank ID at which the agent maintains its payment account.
int partition_id	Partition ID used for parallelization.
double cpi	This is the CPI in firm memory, used in the evaluation of the inventory stock.
double mean_wage	Average wage paid by a firm
double needed_capital_stock	The overall capital stock a firm wants to have
double actual_cap_price	Price of the latest capital good
double mean_specific_skills	Average specific skills of the workforce
double planned_production_quantity	Planned production quantity, has a value on production day, but is reset on other days.
double production_quantity	Actual production quantity, has a value on production day, but is reset on other days.
double planned_output	Planned output is the same as planned production quantity, but retains its value during the month.
double output	Actual output is the same as production quantity, but retains its value during the month.
double unit_costs	Cost per unit of the consumption good

*Continued on next page*

Table 1 – continued from previous page

Name	Description
double total_supply	The sum of local inventory and produced output gives the total supplied quantity
double production_costs	Actual production costs, labor and capital
double revenue_per_day	Daily revenue
estimators_linear_regression_array linear_regression_estimators	Holds the estimators for the linear regression model
double technological_frontier	Best available technology in the economy
double cum_revenue	Monthly revenue
sales_statistics_array malls_sales_statistics	Sales of the last ten months
double quality	Quality of the consumption good
double price	Price of the consumption good
double price_last_month	Price of the consumption good in the last month
double demand_capital_stock	Demand for capital goods
double planned_production_costs	Planned production costs
double adaption_production_volume_due_to_insufficient_finances	Percentage of production by which the quantity is reduced
double fraction_reserved_for_delayed_payments	
sold_quantities_per_mall_array sold_quantities	Sold quantities in the different malls
double total_sold_quantity	Daily sum of sold quantities in all malls. The sold quantity of one firm in all malls.
double cum_total_sold_quantity	Monthly sum of sold quantities in all malls. The monthly sold quantity of one firm in all malls.
double sold_quantity_in_calendar_month	Monthly sum of sold quantities in all malls. The quantity sold in one calendar month.
delivery_volume_per_mall_array delivery_volume	Delivery volume for each mall

*Continued on next page*

Table 1 – continued from previous page

Name	Description
delivery_volume_per_mall_array planned_delivery_volume	Planned delivery volume for each mall
mall_info_array current_mall_stocks	Current stock in each mall
double_array last_planned_production_quantities	Array of the planned production quantities in the past
double total_external_financing_obtained	
double capital_costs	
double labour_costs	
financing_capital_array capital_financing	
double financial_resources_for_production	
double planned_value_capital_stock	
double total_units_local_inventory	
double calc_capital_costs	Calculative capital costs
double calc_production_costs	Calculative production costs
double firm_productivity	min of technology and mean_specific_skills
double firm_productivity_last_year	
double firm_productivity_progress	
potential_lender_array set_of_lenders	Array of structs (potential lender) holding names of (found) active banks.
int number_of_banks_asked	Number of banks where the firm has asked for loans.
double ebit	Earnings-before-interest-and-taxes: total revenue - sales_costs
double earnings	Earnings after interest payments (= ebit - interest)
double tax_rate_corporate	Tax rate on corporate profits (kept in memory)

*Continued on next page*

Table 1 – continued from previous page

Name	Description
double tax_rate_vat	VAT tax rate
double tax_payment	Tax payment over earnings after interest payments (tax_corporate*earnings)
double net_earnings	Net earnings after tax payments (= ebit - interest - tax)
double previous_net_earnings	Net earnings from previous production period
double total_interest_payment	Total interest payments on outstanding debts
double total_debt_installment_payment	Total debt installment payments on outstanding debts
double total_dividend_payment	Total dividend payment
double current_share_price	Current share price on the market
double previous_dividend_per_share	Dividend-per-share ratio (previous production cycle)
double current_dividend_per_share	Dividend-per-share ratio
double previous_earnings_per_share	Earnings-per-Share ratio (previous production cycle)
double current_earnings_per_share	Earnings-per-Share ratio
double previous_dividend_per_earnings	Dividend-to-Earnings ratio (previous production cycle)
double current_dividend_per_earnings	Dividend-to-Earnings ratio
double debt_earnings_ratio	Debt-to-Earnings ratio
double debt_equity_ratio	Debt-to-Equity ratio
double price_earnings_ratio	Price-to-Earnings ratio
double retained_earnings_ratio	Retained earnings-to-Earnings ratio
double earnings_per_share_ratio_growth	Target growth of the Earnings-per-Share ratio
double critical_price_earnings_ratio	Critical (target) value for the Price-Earnings ratio (can be set by the firm)

*Continued on next page*



Table 1 – continued from previous page

Name	Description
double critical_earnings_per_share_ratio	Critical (target) value for the Earnings-per-Share ratio (derived from the growth level)
debt_item_array loans	Array of structs holding all loans of the firm
double total_debt	Total value of all loans outstanding
double total_value_local_inventory	Total value of all local inventory stocks held at malls
double total_units_capital_stock	Units of capital stock
double total_value_capital_stock	Value of the capital stock
double total_capital_depreciation_value	Sum over all units of capital of the depreciation value
double total_capital_depreciation_units	Sum over all units of capital of the depreciation in units
double total_assets	Value of total assets
double equity	equity = total assets - total liabilities
double production_liquidity_needs	Production liquidity needs are production costs (labour costs and investments)
double financial_liquidity_needs	Financial liquidity needs are prior financial commitments (interests, installments, taxes)
double total_financial_needs	Total financial needs = Production liquidity needs + Financial liquidity needs + dividends
double external_financial_needs	External financing
double earnings_per_share	
double total_payments	
int previous_shares_outstanding	
double total_income	Total monthly income (revenues, new bank loans, new share issues). Used for the balance sheet accounting.

*Continued on next page*

Table 1 – continued from previous page

Name	Description
double total_liabilities	
double total_expenses	
double earnings_payout	
int current_shares_outstanding	
Stock stock	
employee_array employees	Used to store the data-type Employee
double wage_offer	The basic wage offer paid per unit of specific skills
double technology	Average technology/productivity of the capital
int no_employees	Number of employees
int no_employees_skill_1	Number of employees with general skills 1
int no_employees_skill_2	Number of employees with general skills 2
int no_employees_skill_3	Number of employees with general skills 3
int no_employees_skill_4	Number of employees with general skills 4
int no_employees_skill_5	Number of employees with general skills 5
int vacancies	Number of vacancies
double average_g_skill	Average general skills of the workforce
double average_s_skill_of_1	Average specific skills of employees with general skills 1
double average_s_skill_of_2	Average specific skills of employees with general skills 2
double average_s_skill_of_3	Average specific skills of employees with general skills 3
double average_s_skill_of_4	Average specific skills of employees with general skills 4
double average_s_skill_of_5	Average specific skills of employees with general skills 5

*Continued on next page*

Table 1 – continued from previous page

Name	Description
double wage_offer_for_skill_1	Wage offer for workers with skill level 1
double wage_offer_for_skill_2	Wage offer for workers with skill level 2
double wage_offer_for_skill_3	Wage offer for workers with skill level 3
double wage_offer_for_skill_4	Wage offer for workers with skill level 4
double wage_offer_for_skill_5	Wage offer for workers with skill level 5
int employees_needed	Number of workers a firm needs for next production
int age	Age of the firm in months.
double transfer_payment	The transfer payment read from message.
double subsidy_pct	The subsidy percentage read from message.
int active	0,1. Flag indicating whether the firm should start production activity.
int bankruptcy_idle_counter	Number of iterations before the bankrupt firm becomes active again and resumes production activity.
int bankruptcy_state	0,1. Flag indicating whether the firm is in bankruptcy.
int bankruptcy_insolvency_state	0,1. Flag indicating whether the firm is in bankruptcy case: insolvency.
int bankruptcy_illiquidity_state	0,1. Flag indicating whether the firm is in bankruptcy case: illiquidity.
int financial_crisis_state	0,1. Flag indicating whether the firm is in a financial crisis state.
double subsidy_payment	

Table 2: List of functions for Firm agent.

Name	Description
Firm_calc_production_quantity	Firm calculate the intended production volume depending on the current stocks in the malls
Firm_set_quantities_zero	Dummy: no production on not_day_of_month_to_act
Firm_calc_input_demands	Firms calculate the labor demand and the demand for capital goods
Firm_calc_production_quantity_2	Firms iterate over the planned production quantity decreasing it incrementally, such that the corresponding labor demand and capital demand can be financed by the actually obtained financial resources, AFTER all prior financial commitments have been paid.
Firm_send_capital_demand	Firm sends demand for capital to the capital goods market.
Firm_receive_capital_goods	Firm sends demand for capital to the capital goods market.
Firm_execute_production	Firm sends demand for capital to the capital goods market.
Firm_calc_pay_costs	In this function the firm receives the purchased investment goods and pays the goods and the wage bill. Additionally, the new mean wage and the new average specific skill level is computed.
Firm_send_goods_to_mall	Here the firms send the produced goods to the malls. If the realized output is less than the intended one, then the malls are only delivered with a proportional share of their planned delivery volumes.
Firm_calc_revenue	Here the firms calc the revenues and profits and then distribute the dividends to households.
idle	Firm does nothing
Firm_compute_sales_statistics	

*Continued on next page*

Table 2 – continued from previous page

Name	Description
Firm_update_specific_skills_of_workers	Because the specific skills of workers have changed the &#xd;&#xd; firms update the specific skill levels of the workers.
idle	
Firm_ask_loan	Firm contacts banks asking for a loan and communicating its balance sheet.
Firm_get_loan	Firm gets the money from banks, adds the loan to its liabilities and register all the loan features (VaR, interest rate).
Firm_compute_financial_payments	Function to compute the prior financial commitments of the firm: interests, installments, taxes.
Firm_compute_income_statement	Function to compute the income statement of the firm.
Firm_compute_dividends	Function to compute the total dividend payout of the firm.
Firm_compute_total_financial_payments	Function to compute the total financial payments of the firm: interest, installments, taxes, production costs, dividends.
Firm_compute_balance_sheet	Function to compute the balance sheet of the firm.
Firm_set_bankruptcy_insolvency	Function to set the type of bankruptcy to ‘insolvency’ and go to end_Firm state. Also sets the active flag to 0 and starts the bankruptcy idle counter.
idle	
Firm_compute_total_liquidity_needs	Function to compute the total liquidity needs for executing payments.
Firm_compute_and_send_stock_orders	Function to send order_messages to the clearinghouse (share emission or repurchase).
Firm_read_stock_transactions	Function to read order_status messages from the clearinghouse, and update the firm’s trading account.
Firm_check_financial_and_bankruptcy_state	Function that checks the balance sheet and sets flags for the bankruptcy- or financial crisis state.

*Continued on next page*

Table 2 – continued from previous page

Name	Description
Firm_set_bankruptcy_illiquidity	unction to set the type of bankruptcy to ‘illiquidity’ and then go to end_Firm state. Also sets the active flag to 0 and starts the bankruptcy idle counter.
Firm_in_financial_crisis	Function to resolve the financial crisis by reducing dividends.
Firm_not_in_bankruptcy	Idle function to transit from state Firm_bankruptcy_checked to state Firm_checks_financial_crisis.
idle	
idle	
idle	
Firm_execute_financial_payments	Function to execute financial payments.
Firm_send_subsidy_notification	Function to send a subsidy_notification_message to the government.
Firm_send_transfer_notification	Function to send a transfer_notification_message to the government.
Firm_bankruptcy_insolvency_procedure	Function to process the bankruptcy condition in case of insolvency.
Firm_bankruptcy_illiquidity_procedure	Function to process the bankruptcy condition in case of illiquidity.
Firm_bankruptcy_idle_counter	Function to decrease the bankruptcy_idle_counter by 1. Note that a negative count means the financing condition has not been yet satisfied at the end of the default idle period.
idle	
Firm_compute_and_send_stock_orders	Function to send order_messages to the clearinghouse (new share emission).
Firm_read_stock_transactions	Function to read order_status messages from the clearinghouse, and update the firm’s trading account.

*Continued on next page*

Table 2 – continued from previous page

Name	Description
Firm_reset_bankruptcy_flags	Function to reset the bankruptcy flags when the bankruptcy process has finished.
idle	
Firm_send_info	
Firm_send_info	
Firm_receive_stock_info	
Firm_calculate_specific_skills_and_wage_offer	
Firm_send_vacancies	If additional workers are needed the firm sends vacancies messages&#xd;&#xd;&#xd;&#xd;&#xd;&#xd; especially the different wage offers for the different general skill groups
Firm_send_redundancies	If the firm wants to decrease the workforce it sends redundancies
Firm_idle	Firm does nothing
Firm_read_job_applications_send_job_offer_or_rejection	Firm reads the application, ranks the applicants according to &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; their general and specific skills and sends as many job offers to the &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; first ranked applicants as the firm has vacancies to fill. &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; The other applicants are refused.
Firm_read_job_responses	The firm reads the responses to their job offers and updates the number of &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; employees and the number of vacancies
Firm_read_job_quitting	The firm reads quitting messages and updates the number &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; of employees and the number of vacancies

*Continued on next page*

Table 2 – continued from previous page

Name	Description
Firm_read_job_quitting	The firm reads quitting messages and updates the number of employees and the number of vacancies
Firm_read_job_quitting	The firm reads quitting messages and updates the number of employees and the number of vacancies
Firm_start_labour_market	Dummy function if a firm has to enter the Labor Market in the second round after receiving quittings
Firm_finish_labour_market_first_round	
Firm_finish_labour_market_first_round	
Firm_update_wage_offer	The firm increases the wage offer if there are vacancies left
Firm_send_vacancies_2	If additional workers are needed the firm sends vacancies messages especially the different wage offers for the different general skill groups
Firm_read_job_applications_send_job_offer_or_rejection_2	Firm reads the application, ranks the applicants according to their general and specific skills and sends as many job offers to the first ranked applicants as the firm has vacancies to fill. The other applicants are refused.
Firm_read_job_responses_2	The firm reads the responses to their job offers and updates the number of employees and the number of vacancies
Firm_read_job_quitting_2	The firm reads quitting messages and updates the number of employees and the number of vacancies

*Continued on next page*



Table 2 – continued from previous page

Name	Description
Firm_read_job_quitting_2	The firm reads quitting messages and updates the number &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; of employees and the number of vacancies
Firm_update_wage_offer_2	The firm increases the wage offer if there are vacancies left
Firm_idle	Firm does nothing
Firm_compute_mean_wage_specific_skills	Firm does nothing
Firm_send_random_redundancies	Firms fire workers randomly.
idle	
Firm_send_id_to_malls	In this function the firm sends its id to the malls. The malls can set up its data array properly if the population file was built with the cloning procedure.
Firm_initialize_mall_arrays	In case of cloned population: Firms receive mall ids and set up their memory variables that are related to the malls.
idle	
idle	
Firm_read_policy_announcements	Function to read the policy_announcements from Govern- ments.
Firm_receive_data	Function to read the messages from the eurostat agent.
idle	Firm does nothing
Firm_send_data_to_Eurostat	Function to send a data_message to the eurostat agent in- cluding several micro data.
idle	Firm does nothing
Firm_send_payments_to_bank	

## 1.2 Household

Table 3: List of memory variables for Household agent.

Name	Description
int id	Agent ID.
int region_id	Region ID to which the agent is associated.
int_array neighboring_region_ids	
int gov_id	Government to which the agent is associated.
int day_of_month_to_act	Activation day.
double payment_account	Current account value.
int bank_id	Bank ID at which the agent maintains its payment account.
int partition_id	Partition ID used for parallelization.
double consumption_budget	Part of the budget for consumption
double consumption_budget_in_month	The budget that is available for consumption during the month
double mean_income	This holds the mean income of the last four periods
int week_of_month	Week counter
double weekly_budget	Budget for one week
int rationed	Indicator: 1: desired good is sold out; 0: else
int mall_completely_sold_out	Indicator: 1: no stocks in the mall, 0: else
ordered_quantity order_quantity	The ordered quantity of the desired good
received_quantities received_quantity	Received quantity of the desired good
int day_of_week_to_act	Weekly shopping day
int day_of_month_receive_income	The day when the household receives the wage or unemployment benefit

*Continued on next page*

**Table 3 – continued from previous page**

<b>Name</b>	<b>Description</b>
double current_productivity_employer	Actual capital productivity of the employer
double current_mean_specific_skills_employer	Average specific skills of the workforce of the employer
double tax_payment	The total amount of taxes paid by household.
double cum_total_dividends	Because dividends are paid daily and taxes monthly, the household has to cumulate dividends
double tax_rate_hh_capital	The current tax rates on capital income
double tax_rate_hh_labour	The current tax rates on labour income
double price_index	The current mean prices sent by Eurostat
double price_index_base_period	The mean prices of a base period
double commuting_costs_price_level_weight	Weight of price level that influences the commuting costs
double_array last_income	
double expenditures	
double received_dividend	
int flag_consumption_shifting	Indicator variable that shows if the consumer has to shift the consumption day due to selling restrictions on the Finacual market.
double excess_weekly_budget	Auxiliary variable to be used in stategraph condition, excess_weekly_budget=weekly_budget-payment_account
double wealth_income_ratio_actual	The actual wealth/mean_income ratio of the household.
double wealth_income_ratio_target	Target value of wealth/mean_income ratio used in the Carrol rule for consumption_budget decision.
double risk_free_rate	Remuneration rate sent by Bank
double wealth	
Belief_array beliefs	

*Continued on next page*

Table 3 – continued from previous page

Name	Description
Order_array pendingOrders	
Asset_array assetsowned	
double_array assetWeights	
double_array assetUtilities	
double cash_on_hand	
int forwardWindow	
int backwardWindow	
int bins	
double randomWeight	
double fundamentalWeight	
double chartistWeight	
int holdingPeriodToForwardW	
double lossaversion	
double strategy	
double wage	The wage a household receives
double wage_reservation	Reservation wage: Worker does not accept a wage offer below the reservation wage
int general_skill	The general skill level (1-5)
int on_the_job_search	Indicator variable: 1 on the job search; 0 no on the job search
int number_applications	Number of applications a worker can sent
double last_labour_income	The last labour income received by the worker if the Household is unemployed

*Continued on next page*

Table 3 – continued from previous page

Name	Description
double specific_skill	The specific skills of a worker
int employee_firm_id	The id of the employer
int employer_region_id	The region_id of the employer
int day_of_month_receive_benefit	The day of the month on which the household receives its unemployment benefit. Equal to the day on which it became unemployed. This value will change when the household becomes re-employed again by another (or the same) firm, with the exception in case the new firm has the same activation day as the old firm.
double unemployment_payment	Unemployment benefit in case the household is unemployed.
double region_wide_mean_wage	Mean wage of the household's region. Used in the computation of unemployment benefits.
double unemployment_benefit_pct	Percentage of last earned wage that is received as unemployment benefit, the net replacement rate.
double transfer_payment	Amount of the transfer payment.
double subsidy_pct	The subsidy percentage read from message.
double total_income	
double total_expenses	
double total_assets	
double total_liabilities	
double gov_interest	
double stock_sales	
double stock_purchases	
double gov_bond_purchases	

*Continued on next page*

Table 3 – continued from previous page

Name	Description
double monthly_consumption_expenditure	
double monthly_bond_interest_income	
double subsidy_payment	
double region_mean_wage	The mean_wage in the household's region. Used in the computation of the unemployment benefits.

Table 4: List of functions for Household agent.

Name	Description
Household_idle	
Household_rank_and_buy_goods_1	
Household_receive_goods_read_rationing	The household gets information about the accepted amount of &#xd;&#xd; goods and, if the mall is completely sold out then the households set the &#xd;&#xd; order and delivery volumes before the second step to zero.
Household_set_values_zero	
Household_rank_and_buy_goods_2	Household receives information about the offered range &#xd;&#xd; of goods in the malls. Depending on these infos the household &#xd;&#xd; sends its good request.
Household_receive_goods_read_rationing_2	This function stores in memory the realized consumption if HH was rationed in first round.
Household_handle_leftover_budget	This function convert the remaining budget, that is not &#xd;&#xd; spent in both consumption steps, into the PAYMENT_ACCOUNT.
Household_send_account_update	Household sends account update to bank.
Household_receives_payment_coupons	
idle	
Household_receive_info_interest_from_bank	
Household_revises_expected_portfolio	the household revise his expected portfolio that is represented by the pendingOrders variable
Household_select_strategy	
Household_stock_beliefs_formation	
Household_bond_beliefs_formation	

*Continued on next page*



Table 4 – continued from previous page

Name	Description
idle	
Household_send_orders	
Household_update_its_portfolio	
Household_read_firing_messages	The household checks whether is is fired or not
Household_idle	Household does nothing
Household_idle	Household does nothing
Household_UNEMPLOYED_read_job_vacancies_and_send_applications	Household reads vacancies messages and sends applications
Household_idle	Household does nothing
Household_read_job_offers_send_response	Household reads the job offers and ranks them &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; according to the wage offer
Household_finish_labour_market	
Household_read_application_rejection_update_wage_reservation	Household reads the application rejections and decreases the &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; reservation wage
Household_UNEMPLOYED_read_job_vacancies_and_send_applications_2	Household reads vacancies messages and sends applications
Household_read_job_offers_send_response_2	Household reads the job offers and ranks them &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; according to the wage offer
Household_read_application_rejection_update_wage_reservation_2	Household reads the application rejections and decreases &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; the reservation wage
Household_idle	Household does nothing
Household_receive_dividends	Household receives the dividend payments
Household_idle	Household does nothing

*Continued on next page*

Table 4 – continued from previous page

Name	Description
Household_idle	Household does nothing
Household_send_subsidy_notification	Household
Household_send_transfer_notification	Household
Household_receive_wage	Household receives the wage / wage_payment_message
Household_update_specific_skills	Household's specific skills are updated if the household is employed.
Household_send_unemployment_benefit_notification	Household receives the unemployment benefit.
Household_send_tax_payment	Household pays the income taxes
Household_determine_consumption_budget	Household determines the consumption and portfolio budget
Household_initialization	Initialization function for household.
idle	Idle for initialization function.
Household_read_policy_announcements	
idle	Idle for read_policy_announcement
Household_receive_data	The household reads the messages from the eurostat agent and stores the needed data.
Household_send_data_to_Eurostat	Household sends message to the eurostat agent including several micro data.
idle	Idle for send_data_to_eurostat
Household_read_data_from_Eurostat	Read the region_wide_mean_wage.

### 1.3 Mall

Table 5: **List of memory variables for Mall agent.**

Name	Description
int id	Agent ID.
int region_id	Region ID to which the agent is associated.
int gov_id	Government to which the agent is associated.
int partition_id	Partition ID used for parallelization.
mall_stock_array current_stock	Actual stock of the different firms
sales_in_mall_array firm_revenues	Actual revenue of the different firms
double total_supply	Total number of goods
double export_volume_matrix	Matrix holding data on exports between regions, measured in volume.
double export_value_matrix	Matrix holding data on exports between regions, measured in value.
double export_previous_value_matrix	Matrix holding data on exports between regions, measured against previous prices.

Table 6: **List of functions for Mall agent.**

Name	Description
Mall_reset_export_data	Mall resets the export data at start of month.
idle	
Mall_update_mall_stock	Malls receive the goods deliveries.
Mall_send_quality_price_info_1	Malls send message with quality and price information.
Mall_update_mall_stocks_sales_rationing_1	Mall reads the consumption requests and satisfies the demand &#xd;&#xd; if possible (otherwise rationing).
Mall_update_mall_stocks_sales_rationing_2	After the second request round the mall satisfies the demand if &#xd;&#xd; possible, otherwise rationing.
Mall_pay_firm	Mall transfers the revenues to the firms.
Mall_send_export_data	Mall sends the export data to Eurostat at end of each month.
idle	
Mall_read_insolvency_bankruptcy	This function reads the bankruptcy message of firms that are in a insolvency.
Mall_send_id_to_firms	In this function the mall sends its id to the firms. The firms can set up its data array properly if the population file was built with the cloning procedure.
Mall_initialize_firm_arrays	In case of cloned population: Malls receive firm ids and set up their memory variables that are related to the firms.
idle	

## 1.4 IGFirm

Table 7: **List of memory variables for IGFirm agent.**

<b>Name</b>	<b>Description</b>
int id	Agent ID.
int region_id	Region ID to which the agent is associated.
int gov_id	Government to which the agent is associated.
int bank_id	Bank ID at which the agent maintains its payment account.
int day_of_month_to_act	Activation day.
double payment_account	Current account value.
int partition_id	Partition ID used for parallelization.
double productivity	Current productivity of the offered capital good
double capital_good_price	Current price of the offered capital good
double revenue_per_day	Revenue of the current day
double tax_rate_corporate	Tax rate on revenues
double tax_rate_vat	Value added tax
double tax_payment	Sum of all taxes the IGFirm has to pay
double net_profit	Earnings minus tax payment
int outstanding_shares	Number of shares outstanding
double current_dividend_per_share	
double earnings	Variable to sum monthly earnings.
double energy_price_markup	Mark up on capital goods price.
double energy_costs_per_day	The share of the daily capital bill that are energy costs.
double earnings_per_day	The collected revenues minus energy costs.

*Continued on next page*

**Table 7 – continued from previous page**

<b>Name</b>	<b>Description</b>
double cum_energy_costs	This is to compute the total expenses for energy.
double_array last_net_profits	Array of the planned production quantities in the past
double dividend_payment	
int age	Age of the firm in months.
double transfer_payment	The transfer_payment read from message.
double subsidy_pct	The subsidy percentage read from message.



Table 8: **List of functions for IG Firm agent.**

Name	Description
IGFirm_update_productivity_price	
IGFirm_idle	
IGFirm_send_quality_price_info	
IGFirm_send_capital_good	
IGFirm_receive_payment	
IGFirm_pay_taxes	
IGFirm_dividend_payment	
IGFirm_idle	
IGFirm_send_payment_account_to_bank	
IGFirm_idle	
IGFirm_read_policy_announcements	

## 1.5 Eurostat

Table 9: **List of memory variables for Eurostat agent.**

Name	Description
int id	Agent ID.
int region_id	Region ID to which the agent is associated.
int partition_id	Partition ID used for parallelization.
int switch_datastorage	Switch to turn on/off datastorage
int num_households	Number of households in the economy
int no_households_skill_1	Number of households in the economy with general skill level 1
int no_households_skill_2	Number of households in the economy with general skill level 2
int no_households_skill_3	Number of households in the economy with general skill level 3
int no_households_skill_4	Number of households in the economy with general skill level 4
int no_households_skill_5	Number of households in the economy with general skill level 5
int employed	Number of employed households
int employed_skill_1	Number of employed households with general skill level 1
int employed_skill_2	Number of employed households with general skill level 2
int employed_skill_3	Number of employed households with general skill level 3
int employed_skill_4	Number of employed households with general skill level 4
int employed_skill_5	Number of employed households with general skill level 5
int unemployed	Number of unemployed Households
double unemployment_rate	Unemployment rate

*Continued on next page*

Table 9 – continued from previous page

Name	Description
double unemployment_rate_skill_1	Unemployment rate general skill level 1
double unemployment_rate_skill_2	Unemployment rate general skill level 2
double unemployment_rate_skill_3	Unemployment rate general skill level 3
double unemployment_rate_skill_4	Unemployment rate general skill level 4
double unemployment_rate_skill_5	Unemployment rate general skill level 5
double average_wage	Average wage in the economy
double average_wage_skill_1	Average wage of households with general skill level 1 in the economy
double average_wage_skill_2	Average wage of households with general skill level 2 in the economy
double average_wage_skill_3	Average wage of households with general skill level 3 in the economy
double average_wage_skill_4	Average wage of households with general skill level 4 in the economy
double average_wage_skill_5	Average wage of households with general skill level 5 in the economy
double average_s_skill	Average specific skills in the economy
double average_s_skill_1	Average specific skills of households with general skill level 1 in the economy
double average_s_skill_2	Average specific skills of households with general skill level 1 in the economy
double average_s_skill_3	Average specific skills of households with general skill level 1 in the economy
double average_s_skill_4	Average specific skills of households with general skill level 1 in the economy

*Continued on next page*

Table 9 – continued from previous page

Name	Description
double average_s_skill_5	Average specific skills of households with general skill level 1 in the economy
int no_firms	Number of firms in the economy
int no_vacancies	Number of vacancies in the economy
int no_employees	Number of employees in the economy (in firms)
int no_employees_skill_1	Number of employees in the economy with general skill level 1 (in firms)
int no_employees_skill_2	Number of employees in the economy with general skill level 2 (in firms)
int no_employees_skill_3	Number of employees in the economy with general skill level 3 (in firms)
int no_employees_skill_4	Number of employees in the economy with general skill level 4 (in firms)
int no_employees_skill_5	Number of employees in the economy with general skill level 5 (in firms)
double firm_average_wage	verage wage in the economy paid by firms
double firm_average_wage_skill_1	Average wage in the economy paid by firms for general skill level 1
double firm_average_wage_skill_2	Average wage in the economy paid by firms for general skill level 2
double firm_average_wage_skill_3	Average wage in the economy paid by firms for general skill level 3
double firm_average_wage_skill_4	Average wage in the economy paid by firms for general skill level 4
double firm_average_wage_skill_5	Average wage in the economy paid by firms for general skill level 5
double firm_average_s_skill	Average specific skills in firm in the economy

*Continued on next page*

Table 9 – continued from previous page

Name	Description
double firm_average_s_skill_1	Average specific skills of general skill level 1 in firms in the economy
double firm_average_s_skill_2	Average specific skills of general skill level 2 in firms in the economy
double firm_average_s_skill_3	Average specific skills of general skill level 3 in firms in the economy
double firm_average_s_skill_4	Average specific skills of general skill level 4 in firms in the economy
double firm_average_s_skill_5	Average specific skills of general skill level 5 in firms in the economy
firm_data_array region_firm_data	Stores the eurostat memory variables concerning the firms for the different regions
household_data_array region_household_data	Stores the eurostat memory variables concerning the households for the different regions
double total_earnings	Total profits across firms (sum of net_earnings)
double total_debt	Total debts across firms (sum of total_debt)
double total_assets	Total value of assets across firms
double total_equity	Total value of equity across firms
double average_debt_earnings_ratio	Constructed macrovariable: average debt/earnings ratio across firms (total debt divided by total earnings)
double average_debt_equity_ratio	Constructed macrovariable: average debt/equity ratio across firms (total debt divided by total equity)
double labour_share_ratio	Constructed macrovariable: average labour share across firms (defined as total wages divided by total profits)
double cpi	Consumer Price Index. Measured as a weighted price index across all firms, all malls, using as weights the firms' market shares.

*Continued on next page*

Table 9 – continued from previous page

Name	Description
double gdp	GDP = Consumption + Investments (measured at firms, sum of cum_revenues + investment_costs)
double monthly_investment_value	Constructed macrovariable: monthly value of investments, aggregating the firms capital costs.
double monthly_sold_quantity	Constructed macrovariable: regional sum of sold quantity
double monthly_output	Constructed macrovariable: regional sum of output
double monthly_revenue	Constructed macrovariable: regional sum of cum_revenue
double monthly_planned_output	Constructed macrovariable: regional sum of planned output
double price_index	Constructed macrovariable: weighted mean prices
history_item history_monthly	History: monthly data
history_item history_quarterly	History: quarterly data
history_item monthly_growth_rates	History: monthly growth rates
history_item quarterly_growth_rates	History: quarterly growth rates
history_item annual_growth_rates_monthly	History: annual growth rates measured each month
history_item annual_growth_rates_quarterly	History: annual growth rates measured each quarter
int no_firm_births	Number of new firms in the economy this month
int no_firm_deaths	Number of firm demises in the economy this month
int firm_age_distribution	Distribution of firm ages in 60 bins (in months, max age 60 months)
int firm_age_distribution_multiperiod	Distribution of firm ages in 60 bins (in months, max age 60 months)
int firm_age_distribution_1_period_lag	Copy of firm_age_distribution[60], needed for the computation of survival rates.

*Continued on next page*

Table 9 – continued from previous page

Name	Description
int firm_age_distribution_2_period_lag	Copy of firm_age_distribution[60], needed for the computation of survival rates.
double firm_birth_rate	Firm birth rate: Number of new firms in the economy this month, divided by the total number of firms that are active this month.
double firm_death_rate	Firm death rate: Number of firm demises in the economy this month, divided by the total number of firms that are active this month.
double survival_rate	Firm survival rates in 60 age bins: Definition "The survival rate after 1 year is the percentage of all enterprise births of year n which are still active in year n+1." We only measure the 1-month survival rate: the percentage of firms age 0-59 months that are still active in the next month, thus having age 1-60 months.
double survival_rate_multiperiod_1	Multi-period survival rates. Definition: "The survival rate after x years is the percentage of all enterprise births of year n which are still active in year n+x." The 1st row survival_rate_multiperiod[0][.] equals survival_rate[], and contains the 1-period survival rates (for all age bins 0-59). The 2nd row survival_rate_multiperiod[1][.] contains the 2-period survival rates (for all age bins 0-59), etc.
double survival_rate_multiperiod_2	Multi-period survival rates. Definition: "The survival rate after x years is the percentage of all enterprise births of year n which are still active in year n+x." The 1st row survival_rate_multiperiod[0][.] equals survival_rate[], and contains the 1-period survival rates (for all age bins 0-59). The 2nd row survival_rate_multiperiod[1][.] contains the 2-period survival rates (for all age bins 0-59), etc.

*Continued on next page*



Table 9 – continued from previous page

Name	Description
double survival_rate_multiperiod	Multi-period survival rates. Definition: "The survival rate after x years is the percentage of all enterprise births of year n which are still active in year n+x." The 1st row survival_rate_multiperiod[0][.] equals survival_rate[], and contains the 1-period survival rates (for all age bins 0-59). The 2nd row survival_rate_multiperiod contains all survival rates (for periods 1...12, for all age bins 0-59), etc.
int max_firm_creation	
int recession_started	Indicator signalling the start of a recession. 0: no recession, 1: recession.
int recession_duration	Duration of a recession measured in quarters.
double export_volume_matrix	Matrix holding data on exports between regions, measured in volume.
double export_value_matrix	Matrix holding data on exports between regions, measured in value.
double export_previous_value_matrix	Matrix holding data on exports between regions, measured against previous prices.
double region_export_volume	Array holding data on total exports of each region, measured in volume.
double region_import_volume	Array holding data on total imports of each region, measured in volume.
double region_export_value	Array holding data on total exports of each region, measured in value.
double region_import_value	Array holding data on total imports of each region, measured in value.
double region_import_previous_value	Array holding data on total imports of each region, measured in value against previous prices.
double firm_average_productivity_progress	Average productivity progress of the firms in the last month.

*Continued on next page*

**Table 9 – continued from previous page**

<b>Name</b>	<b>Description</b>
double firm_average_productivity	Average productivty of the firms in the last month.
double investment_gdp_ratio	Ratio of investment/gdp.

Table 10: **List of functions for Eurostat agent.**

Name	Description
Eurostat_send_data	Eurostat sends the data to the other agents
Eurostat_idle	Eurostat does nothing
Eurostat_idle	
Eurostat_calculate_data	Eurostat calculates the global and regional macro data based on the received micro data
Eurostat_store_history_monthly	Eurostat stores monthly macro data in its history struct.
Eurostat_compute_growth_rates_monthly	Eurostat computes monthly growth rates for macro data stored in its monthly history struct.
Eurostat_idle	Eurostat does nothing
Eurostat_store_history_quarterly	Eurostat stores quarterly macro data in its history struct.
Eurostat_compute_growth_rates_quarterly	Eurostat computes quarterly growth rates for macro data stored in its quarterly history struct.
Eurostat_measure_recession	Eurostat measures the start or end of recessions.
Eurostat_idle	Eurostat does nothing
Eurostat_idle	Eurostat idle
Eurostat_send_data_to_government	Eurostat sends the data to the governments for determining policies.
Eurostat_initialization	Initialization function for Eurostat.
idle	Idle for initialization function.

## 1.6 Bank

Table 11: **List of memory variables for Bank agent.**

Name	Description
int id	Agent ID.
int region_id	Region ID to which the agent is associated.
int gov_id	Government to which the agent is associated.
int partition_id	Partition ID used for parallelization.
double cash	Bank's reserves.
double total_credit	Sum of outstanding loans.
double equity	Total assets minus total liabilities (or cumulated profits).
double ecb_debt	Stock of liquidity borrowed from Central Bank.
double alfa	Basel II regulatory parameter
double value_at_risk	Total value at risk of bank's loan portfolio.
double deposits_rate	Rate on deposits.
double bank_gamma	Behavioural parameter used to set interest rates.
double profits	Current and past profits.
double bank_lambda	Exogenous parameter regulating the speed of adjustment of BANK_GAMMA parameter.
double ecb_interest_rate	Base interest rate charged by Central Bank.
double bank_dividend_rate	Percentage of bank's dividends on profits.
double tax_rate_corporate	Government tax rate on corporate profits.
int current_shares_outstanding	Number of issued shares.
double debt_period	
int loan_request_message_found	

*Continued on next page*

Table 11 – continued from previous page

Name	Description
int day_of_month_to_act	Day of the month to act for bank accounting function.
double deposits	Total end-of-the-day deposits.
double firm_loan_installments	Installment amount received by firms.
double firm_interest_payments	Interests paid by firms.
double firm_loan_issues	
double ecb_interest_payment	Interests bank pays to Central Bank.
double total_dividends	
double taxes	
double dividend_per_share	Dividends earned by one share.
double current_share_price	Market price of bank's shares.
double total_income	
double total_expenses	
double total_assets	
double total_liabilities	

Table 12: **List of functions for Bank agent.**

Name	Description
Bank_read_policy_rate	The bank reads policy rate and updated risk free rate
idle	The bank does not update risk free rate
Bank_communicate.identity	Active banks communicate their identity to firms at the opening of the credit market.
Bank_send_dividend_payment	Function to send the dividend_per_share message to households.
Bank_set_quantities_zero	
Bank_send_accountInterest	Bank communicates the interest rate on deposits.
Bank_decide_credit_conditions	Bank sets loan conditions for the applying firms.
Bank_give_loan	Bank accounts the feature of the granted loan and updates its portfolio.
Bank_receive_installment	Bank receives periodic interests and installments from client firms.
Bank_account_update_deposits	Bank updates its deposits and if needed reduces its exposition towards Central Bank.
Bank_accounting	Balance sheet updates are executed.
Bank_idle	
Bank_update_ecb_account	Bank sends a message to ECB with its cash (payment account of the Bank at the ECB).
idle	
Bank_read_policy_announcements	

## 1.7 Government



Table 13: **List of memory variables for Government agent.**

Name	Description
int id	Agent ID.
int_array list_of_regions	List of regions that are associated to the government.
double payment_account	Current account value.
int day_of_month_to_act	Activation day.
int region_id	Region ID to which the agent is associated.
int partition_id	Partition ID used for parallelization.
Bond bond	
Order pending_order	
double unemployment_benefit_pct	Variable that sets the unemployment benefit as a fraction of last labour income.
double gdp_fraction_consumption	Parameter that sets the government consumption expenditure as a fraction of GDP.
double gdp_fraction_investment	Parameter that sets the government investment expenditure as a fraction of GDP.
double tax_rate_corporate	Corporate tax rate on firm and bank profits.
double tax_rate_hh_labour	Labour income tax rate for households.
double tax_rate_hh_capital	Capital gains tax rate for households.
double tax_rate_vat	VAT tax.
double monthly_tax_revenues	Monthly tax revenues.
double yearly_tax_revenues	Yearly tax revenues.
double monthly_benefit_payment	Unemployment benefit payments to all unemployed households.

*Continued on next page*

Table 13 – continued from previous page

Name	Description
double yearly_benefit_payment	Unemployment benefit payments for all unemployed households.
double hh_transfer_payment	Household transfer payment amount.
double firm_transfer_payment	Firm transfer payment amount.
double monthly_transfer_payment	Aggregate monthly transfer payments.
double yearly_transfer_payment	Aggregate yearly transfer payments.
double hh_subsidy_pct	The household subsidy percentage on the price of consumer goods.
double firm_subsidy_pct	The firm subsidy percentage on the price of capital goods.
int subsidy_flag	Indicator to indicate if stabilization subsidy is active. 1 means active, 0 means inactive.
double monthly_subsidy_payment	Aggregate monthly subsidy payments.
double yearly_subsidy_payment	Aggregate yearly subsidy payments.
double monthly_bond_interest_payment	Aggregate monthly bond interest payments.
double yearly_bond_interest_payment	Aggregate yearly bond interest payments.
double gov_interest_rate	Interest rate the government uses to pay interest on the public debt.
double yearly_investment_expenditure	The actual yearly government investment expenditure that is realised at the end of the year.
double yearly_consumption_expenditure	The actual yearly government consumption expenditure that is realised at the end of the year.
double yearly_income	The actual total government income received at the end of the year.
double yearly_expenditure	The actual total government expenditure at the end of the year.

*Continued on next page*

Table 13 – continued from previous page

Name	Description
double total_debt	Government debt.
double yearly_budget_balance	The budget balance (deficit/surplus) that is realised at the end of the year.
double total_money_financing	The fraction of the budget deficit that is financed by money creation.
double total_bond_financing	The fraction of the budget deficit that is financed by government bonds.
double country_wide_mean_wage	Country wide mean wage is the mean wage for all regions associated to this government.
int num_unemployed	The number of unemployed that are associated to the government.
double gdp	This is the GDP for the regions belonging to this government.
double gdp_growth	GDP growth rate (updated once per year).
double gdp_forecast	Forecast for next year's GDP.
double yearly_income_forecast	Forecasted/planned total government income for the next year.
double yearly_expenditure_budget	The total expenditure budget for the next year.
double budget_balance_forecast	Forecast for the budget balance (deficit/surplus).
double monthly_consumption_expenditure	The actual monthly government consumption expenditure that is realised at the end of the month.
double monthly_investment_expenditure	The actual monthly government investment expenditure that is realised at the end of the month.
double monthly_budget_balance	The budget balance (deficit/surplus) that is realised at the end of the month.
double monthly_consumption_budget	The consumption budget for the next month.
double monthly_investment_budget	The investment budget for the next month.

*Continued on next page*

Table 13 – continued from previous page

Name	Description
double monthly_income	The actual total government income at end of month.
double monthly_expenditure	The actual total government expenditure at end of month.
double yearly_consumption_budget	The planned consumption budget for the next year.
double yearly_investment_budget	The planned investment budget for the next year.
double total_assets	
double total_liabilities	
double cumulated_deficit	The cumulative sum of deficits, updated monthly.
double inflation_rate	This is the economy-wide inflation_rate.
double unemployment_rate	This is the economy-wide unemployment_rate.

Table 14: **List of functions for Government agent.**

Name	Description
Government_pays_coupons	
Government_read_policy_rate	Government reads the policy rate from the CB and updates the bonds yield
Government_send_info_bond	
Government_orders_issuing	
Government_update_its_portfolio	
Government_receive_info_bond	
idle	
Government_initialization	Initialization function, runs only once at the start.
idle	Idle for initialization function.
Government_monthly_resetting	Monthly resetting of counters.
idle	Idle for monthly resetting loop at top.
idle	Idle for yearly loop at top.
Government_send_policy_announcements	Function to send the yearly policy announcement message.
Government_read_tax_payments	Function to read the tax revenues and store the monthly and yearly totals.
Government_read_subsidy_notifications	Counter of the <code>subsidy\_notification</code> messages, monthly and yearly totals of the subsidy payments.
Government_read_transfer_notifications	Counter of the <code>transfer\_notification</code> messages, monthly and yearly totals of the transfer payments.
Government_read_unemployment_benefit_notifications	Counter of the <code>unemployment</code> messages, monthly and yearly totals of the unemployment benefit payments.
idle	Idle for yearly loop

*Continued on next page*

Table 14 – continued from previous page

Name	Description
Government_resolve_unsold_bonds	To resolve the remaining deficit that remains after bond rationing on the bond market, the government sells the unsold bonds to the ECB, in return for newly created fiat money (quantitative easing).
Government_monthly_budget_accounting	Function to perform accounting at the end of each month.
Government_bonds_issuing_decision	Function to decide how many bonds to issue.
idle	Idle function if Gov does not issue new bonds.
Government_send_account_update	Function to send the payment_account value to the Central Bank.
idle	
Government_yearly_budget_accounting	Function to perform accounting at the end of each year.
Government_read_data_from_Eurostat	Function to read data from Eurostat.
Government_set_policy	Function to set policy rules: income forecast and expenditure budget.
Government_yearly_resetting	Yearly resetting of counters.

## 1.8 Central Bank

Table 15: **List of memory variables for Central\_Bank agent.**

Name	Description
int id	Agent ID.
int region_id	Region ID to which the agent is associated.
int partition_id	Partition ID used for parallelization.
double ecb_interest_rate	Base rate of the Central Bank.
double equity	The ECB equity is the account to collect the interest payments from the banks and the government bond interest rate payments. The equity of ECB is paid out to all governments as dividends, in proportion to their population.
double dividend_payment	The equity of ECB is paid out to all governments as dividends, in proportion to their population.
double fiat_money	This is the total fiat money.
double fiat_money_banks	This is the sum over banks' ECB_debt, on the ECB's balance sheet, here named as a CB liability.
double ecb_deposits	Total sum of deposits by governments and banks at the ECB.
account_item_array accounts_banks	
account_item_array accounts_govs	
double cash	CB liquid asset which takes into account interest payments to CB from banks and (in the future) from gov.
double bond_holdings_value	Total monetary amount of the ECBs government bond holdings.
int nr_gov_bonds	
double fiat_money_govs	Money given to governments in exchange of gov bonds or for free

*Continued on next page*



Table 15 – continued from previous page

Name	Description
double bank_interest	
double gov_interest	
double gov_bond_purchase	
double total_income	
double total_expenses	
double total_assets	
double total_liabilities	

Table 16: **List of functions for Central\_Bank agent.**

Name	Description
Central_Bank_read_account_update	Central Bank updates accounts of banks and Government.
Central_Bank_monetary_policy	Central bank implements monetary policy.
idle	Central bank does not implement monetary policy.
Central_Bank_read_fiat_money_requests	Function read the requests for fiat money sent by governments.

## 1.9 Clearinghouse

Table 17: **List of memory variables for Clearinghouse agent.**

Name	Description
int id	Agent ID.
int region_id	Region ID to which the agent is associated.
int partition_id	Partition ID used for parallelization.
Asset_array assets	
ClearingMechanism clearingmechanism	

Table 18: **List of functions for Clearinghouse agent.**

<b>Name</b>	<b>Description</b>
ClearingHouse_receive_info	
ClearingHouse_receive_orders_and_run	
ClearingHouse_send_asset_information	

## 1.10 Messages

See Table 19.

Table 19: **List of messages.**

Name	Description
bank_account_update int id int bank_id double payment_account	Sent by agents to inform their bank about the current payment account balance. Sending agent ID. Receiving bank agent ID. Current account value.
bank_to_central_bank_account_update int id double payment_account double ecb_debt	Banks send account information to central bank Sending agent ID. Current account value. Debt of the bank to the Central Bank
gov_to_central_bank_account_update int id double payment_account	Governments send account information to central bank Sending agent ID. Current account value.
wage_payment  int firm_id int worker_id double payment double productivity double average_specific_skills	Sent by firms. Including the id, the worker id, the wage and &#xd;&#xd; the productivity and mean specific skills of the employer in &#xd;&#xd; order to update the specific skills.
quality_price_info_1  int mall_id int mall_region_id int firm_id double quality	Sent by mall. Including id, region id, id of the supplier (firm), the &#xd;&#xd; quality and price of the goods to inform the households about these goods.

*Continued on next page*

Table 19 – continued from previous page

Name	Description
double price int available	
quality_price_info_2  int mall_id int mall_region_id int firm_id double quality double price int available	Sent by mall. Including id, region id, id of the supplier (firm), &#xd;&#xd; the quality and price of the goods to inform the households about these goods.
update_mall_stock int mall_id int firm_id double quantity double quality double price double previous_price	Send by mall. Updates the firm regarding the stocks of the firm in the mall.
consumption_request_1  int mall_id int worker_id int region_id int firm_id double quantity	Sent by household. Including the id, the mall id, the id of the &#xd;&#xd; supplier and the quantity of the good a household wants to have.
consumption_request_2	Sent by household. Including the id, the mall id, the id of the &#xd;&#xd; supplier and the quantity of the good a household wants to have.

*Continued on next page*



Table 19 – continued from previous page

Name	Description
int mall_id int worker_id int region_id int firm_id double quantity	
accepted_consumption_1 int mall_id int household_id double offered_consumption_volume int rationed	Sent by mall. Quantity of the good which can be delivered by the mall.
accepted_consumption_2 int mall_id int household_id double offered_consumption_volume int rationed	Sent by mall. Quantity of the good which can be delivered by the mall.
sales int mall_id int firm_id double revenue int stock_empty double current_stock	Sent by mall. Mall informs the firms about the revenue and if there are some stocks left.
specific_skill_update int id int firm_id double specific_skills	Sent by households. Household informs the firm about the updates specific skills.

*Continued on next page*

Table 19 – continued from previous page

Name	Description
policy_rate double policy_rate_value	Message sent by CB to communicate the policy rate. rate value
bank_identity int bank_id	Message added by bank to communicate its existence to firms. name of the bank
loan_request int firm_id int bank_id double equity double total_debt double external_financial_needs	Message added by firm to demand credit with bank_id, with financial info of applying firm.
loan_conditions int firm_id int bank_id double proposed_interest_rate double amount_offered_credit double value_at_risk	Message added by bank to offer credit; contains the interest rate, the amount of offered credit, and the value_at_risk.
loan_acceptance int bank_id double credit_amount_taken double loan_total_var	Message added by firm to accept a loan with bank_id, for the amount credit_taken and VAR. The bank does not need to know the firm_id.
installment int bank_id double installment_amount	Message added by firm pays installment and interest to the bank.  installment_amount is 0 in case of bankruptcy, positive in case of No_bankruptcy

*Continued on next page*

Table 19 – continued from previous page

Name	Description
double interest_amount double var_per_installment	
bankruptcy int firm_id int bank_id double bad_debt double credit_refunded double residual_var	Message added by firm to bank to signal bankruptcy.
bank_interest_payment double bank_interest_amount	Interests paid by banks to ecb
accountInterest int bank_id double interest	message posted by the Bank
dividend_per_share int firm_id double current_dividend_per_share	Added by firm to send msg to shareholders with dividends per share
bankruptcy_illiquidity int firm_id	Bankruptcy msg send by firm to mall.
bankruptcy_insolvency int firm_id	Bankruptcy msg send by firm to mall.
order int trader_id int asset_id double limit_price int quantity	order posted by the Household
order_status	order status posted by clearing house

*Continued on next page*

Table 19 – continued from previous page

Name	Description
int trader_id int asset_id double price int quantity	
infoAssetCH int asset_id double price int quantity	message posted by the Clearing House
info_firm int id double earnings double dividend double earnings_payout double equity Stock stock	message posted by the Firm
info_bond Bond bond	message posted by the Government
payment_coupons double coupon int government_id	message posted by the Government, announce the payment coupons and it decreases its payment_account  the unitary cost of a coupon
productivity int IGfirm_id double cap_productivity double cap_good_price	
capital_good_request int firm_id double capital_good_demand	

*Continued on next page*

Table 19 – continued from previous page

Name	Description
capital_good_delivery int firm_id double capital_good_delivery_volume double productivity double capital_good_price	
pay_capital_goods int firm_id double capital_bill	
vacancies  int firm_id int region_id double firm_wage_offer_for_skill_1 double firm_wage_offer_for_skill_2 double firm_wage_offer_for_skill_3 double firm_wage_offer_for_skill_4 double firm_wage_offer_for_skill_5	Send by firms. Includes the id, the region id the number of vacancies and the &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; wage offer for the according general skill level.
vacancies2  int firm_id int region_id double firm_wage_offer_for_skill_1 double firm_wage_offer_for_skill_2 double firm_wage_offer_for_skill_3 double firm_wage_offer_for_skill_4 double firm_wage_offer_for_skill_5	Send by firms. Includes the id, the region id the number of vacancies and the &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; wage offer for the according general skill level.

*Continued on next page*

Table 19 – continued from previous page

Name	Description
firing int firm_id int worker_id	Send by firms. Includes the firm_id and the id of the dismissed employee.
job_application  int worker_id int firm_id int region_id int general_skill double specific_skill	Send by households to apply for a job. Includes the id, firm id, region id the general &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; as well as the specific skills.
job_application2  int worker_id int firm_id int region_id int general_skill double specific_skill	Send by households to apply for a job. Includes the id, firm id, region id the general &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; as well as the specific skills.
job_offer  int firm_id int worker_id int region_id double wage_offer	Send by firms to make a job offer for a household. Includes the id, worker id and the &#xd;&#xd;&#xd;&#xd;&#xd;&#xd; corresponding wage offer.

*Continued on next page*

Table 19 – continued from previous page

Name	Description
job_offer2	Send by firms to make a job offer for a household. Includes the id, worker id and the corresponding wage offer.
int firm_id	
int worker_id	
int region_id	
double wage_offer	
job_acceptance	Send by households to accept the job offer. Includes the id, firm id, region id, the general skills as well as the specific skills.
int worker_id	
int firm_id	
int region_id	
int general_skill	
double specific_skill	
job_acceptance2	Send by households to accept the job offer. Includes the id, firm id, region id the general skills as well as the specific skills.
int worker_id	
int firm_id	
int region_id	
int general_skill	
double specific_skill	
quitting	Send by households to quit the current job. Includes the id, firm id.
int worker_id	
int firm_id	

*Continued on next page*

Table 19 – continued from previous page

Name	Description
quitting2 int worker_id int firm_id	Send by households to quit the current job. Includes the id, firm id.
unemployment_notification int gov_id double unemployment_payment	Household sends unemployment notification to gov, applying for unemployment benefits.
policy_announcement int gov_id double tax_rate_corporate double tax_rate_hh_labour double tax_rate_hh_capital double tax_rate_vat double unemployment_benefit_pct double hh_subsidy_pct double firm_subsidy_pct double hh_transfer_payment double firm_transfer_payment	Government announcing tax rates, benefits, transfer payments and subsidies.
tax_payment int gov_id double tax_payment	Added by agents to pay taxes
hh_transfer_notification int gov_id	An agent applies for a transfer payment and notifies its government.
hh_subsidy_notification int gov_id	An agent applies for a subsidy payment and notifies its government.

*Continued on next page*



Table 19 – continued from previous page

Name	Description
double subsidy_payment	
firm_transfer_notification int gov_id	An agent applies for a transfer payment and notifies its government.
firm_subsidy_notification int gov_id double subsidy_payment	An agent applies for a subsidy payment and notifies its government.
request_fiat_money double nominal_value	The government requests fiat money directly from the ECB, without issuing bonds.
issue_bonds_to_ecb double nominal_value int quantity	The government issues bonds to the ECB in case it cannot sell them on the bond market. Nominal value of the bond issue. Number of bonds issued
firm_send_data int firm_id int region_id int vacancies int employees int employees_skill_1 int employees_skill_2 int employees_skill_3 int employees_skill_4 int employees_skill_5 double average_wage double average_s_skill double average_s_skill_1 double average_s_skill_2	Send by firms to Eurostat. Includes micro data.

*Continued on next page*

Table 19 – continued from previous page

Name	Description
double average_s_skill_3	
double average_s_skill_4	
double average_s_skill_5	
double cum_revenue	
double capital_costs	
double net_earnings	
double total_debt	
double total_assets	
double equity	
double price	
double price_last_month	Price of the consumption good in the last month
double total_supply	
double cum_total_sold_quantity	Monthly sum of sold quantities in the different malls
double output	
double planned_output	
int age	Age of the firm in months
double firm_productivity	
double firm_productivity_progress	
household_send_data	Sent by households to eurostat. Includes micro data.
int household_id	
int region_id	
int general_skill	
int employment_status	
double wage	
double specific_skill	
mall_data	Sent by mall. Mall informs Eurostat about exports between regions.
int mall_id	
int firm_region	

*Continued on next page*

Table 19 – continued from previous page

Name	Description
int household_region double export_volume double export_value double export_previous_value	
eurostat_send_specific_skills int region_id double specific_skill_1 double specific_skill_2 double specific_skill_3 double specific_skill_4 double specific_skill_5 double productivity_progress double cpi	Sent by Eurostat. Includes the average specific skills of the different general skill groups for each region.
data_for_government int region_id double gdp double mean_wage	Sent by Eurostat to governments. Includes the region_id and gdp for the region. Used by gov to compute its GDP. Also contains the mean wage for the region. Region to which the data applies. GDP in the region. Mean wage in the region.
eurostat_send_macrodata double inflation double gdp double unemployment_rate	
msg_firm_id_to_malls int firm_id int region_id	
msg_mall_id_to_firms	

*Continued on next page*

Table 19 – continued from previous page

Name	Description
int mall_id	

## 1.11 Constants

See Table 20.

Table 20: **List of constants.**

Name	Description
int total_regions	Total number of regions.
int print_log	0 or 1, A flag to print logging output to terminal or to file.
int print_debug_afm	0 or 1, A flag to print logging output to terminal or to file.
int print_debug_exp1	0 or 1, A flag to print logging output to terminal or to file.
int print_debug_file_exp1	0 or 1, A flag to print logging output to terminal or to file.
int print_debug_file_exp2	0 or 1, A flag to print logging output to terminal or to file.
int policy_exp1	Used in Government code. 0 or 1, A flag to print logging output to terminal or to file.
int print_debug_gov	0 or 1, A flag to print logging output to terminal or to file.
int print_debug_andrea	0 or 1, A flag to print logging output to terminal or to file.
int print_debug_credit	0 or 1, A flag to print logging output to terminal or to file.
int print_debug_consumption	0 or 1, A flag to print logging output to terminal or to file.
int print_debug	0 or 1, A flag to print debugging output to terminal.
int policy_exp_energy_shock	Switch for policy experiment: energy shock.
int policy_exp_stabilization	Switch for policy experiment: stabilization policy.
int const_bankruptcy_idle_period	Number of iterations that a bankrupt firm remains idle, before resuming production activity.
int days_per_month	Optional setting for the number of days in a month.
int number_of_banks_to_apply	Number of banks to which firms can apply for loans.
int const_number_of_banks	Total number of banks.
int const_installment_periods	Number of months to make debt installment payments before a loan is fully repaid.
double const_wage_wealth_ratio	The household's initial ratio between wage and wealth. This parametrizes the link between the unit price of capital and the unit price of labour.
double const_firm_leverage	Initial leverage (debt/equity ratio) of each firm.
double const_income_tax_rate	Constant income tax rate for sensitivity analysis.

*Continued on next page*

Table 20 – continued from previous page

Name	Description
double debt_rescaling_factor	The debt rescaling factor $\omega$ is used in case of a firm bankruptcy to rescale the debt. This is a process of debt-to-equity transformation. It sets the target debt level in relation to the value of total assets: $L^* = \omega A^*$ . The firm will not refund all of its loans completely, but will write off every loan with a certain ratio: $w_j = (1 - L^*/L)L_j$ for loan $j$ . The fraction $(1 - L^*/L)$ is the write-off ratio, and $w_j$ is the monetary amount of the write-off for loan $j$ .
double target_leverage_ratio	The target leverage ratio is the proportion of the target debt to target equity: $\ell = L^*/E^*$ . This determines the target equity level as $E^* = (1/\ell)L^*$ and sets the amount of equity that the firm should raise on the financial market.
double target_liquidity_ratio	The target liquidity ratio is a parameter used in the case of firm bankruptcy due to illiquidity. The amount of equity to raise on the AFM equals $\alpha(F - P)$ , where $\alpha$ is the target liquidity ratio, F are the financial commitments, and P is the payment account.
double const_dividend_earnings_ratio	The parameter <code>const_dividend_earnings_ratio</code> is used to determine the first positive dividend payment (if the dividend was set to 0, or at the start): $\text{TOTAL\_DIVIDEND\_PAYMENT} = \text{CONST\_DIVIDEND\_EARNINGS\_RATIO} * \text{NET\_EARNINGS};$
double trading_activity	household choose randomly to trade or not.
double bonds_newissue_discount	
int couponperiodicitynrmonths	payment coupon period expressed in number of months: typical value is 6
double fundamental_return_weight_min	constant value that regulate the minumum value of the fundamental weight: typical value is 0.1
int days_in_month	number of days in month : typical value is 20
int symmetric_shock	Binary parameter to set if the energy shock is symmetric.
int energy_shock_start	Day when the energy shock starts.

*Continued on next page*

Table 20 – continued from previous page

Name	Description
int energy_shock_end	Day when the energy shock ends.
double const_energy_shock_intensity	Mark up on the capital goods price that flows out of the system, representing energy costs.
int energy_shock_frequency	The frequency at which the energy price is updated.
double gamma_const	-2, Strength of logit rule for consumption
double alpha	0.662, Parameter for production function.
double beta	0.338, Parameter for production function.
double depreciation_rate	0.01, Capital depreciation rate.
double mark_up	0.2, Pricing rule: mark up on unit costs.
double lambda	0.5, Strength of the influence of the actual demand on the next production quantity: if LAMBDA = 0 then the planned production quantities of the last periods are recognized. If LAMBDA = 1 then only the actual demand is recognized.
double wage_update	0.02, Parameter for adaption of the wage offer: percentage
int min_vacancy	2, minimum number of vacancies to trigger vacancy counter
double wage_reservation_update	0.02, Parameter adaption of the reservation wage: percentage.
double region_cost	0.2, Cost of working in a different region: commuting costs.
double target_savings_rate	This is the target savings rate of an household. Typical value: 0.1
double carrol_consumption_parameter	0.01, Percentage of the excess (wealth-target_wealth) allocated to the consumption budget.
double quantil_normal_distribution	Quantil of the normal distribution used for the production planning rule
int firm_planning_horizon	10, Planning horizon of firms
double inv_inertia	Inertia of investing in the physical capital.
double adaption_delivery_volume	This variable increses the sales reported by the mall when the stock was sold out. It is used as an rough demand estimation.
double delivery_prob_if_critical_stock_0	25, Probability for the delivery if the critical stock of one mall was zero for the last periods.
double innovation_probability	10. Probability that the investment goods producer innovate a new technology.

*Continued on next page*



Table 20 – continued from previous page

Name	Description
double productivity_progress	0.05. Gives the increase of productivity of an innovation.
int lower_bound_firing	
int upper_bound_firing	Upper bound of the range from that the firm draws randomly the number of fired workers.
double logit_parameter_specific_skills	Logit parameter for specific skills used in firm's hiring decision.
double logit_parameter_general_skills	Logit parameter for general skills used in firm's hiring decision.
double gov_policy_unemployment_benefit_pct	Parameter to set the net replacement rate (the unemployment benefit as a fraction of last labour income).
double gov_policy_money_financing_fraction	Parameter to set the fraction of the budget deficit to be financed by money financing.
double gov_policy_gdp_fraction_consumption	Parameter to set government consumption expenditure as a fraction of GDP.
double gov_policy_gdp_fraction_investment	Parameter to set government investment expenditure as a fraction of GDP.
int no_regions_per_gov	Number of regions per government. Default 2.
int gov_policy_switch_quantitative_easing	Constant to switch on/off automatic quantitative easing: gov issues bonds to ecb.&#xd;
double subsidy_trigger_on	Trigger floor level of the GDP growth rate, below which the subsidy is switched on. Typically set to -0.01.&#xd;
double subsidy_trigger_off	Trigger ceiling level of the GDP growth rate, above which the subsidy is switched off. Typically set to +0.01.&#xd;
double subsidy_gdp_ratio	The subsidy percentage is a ratio of the - GDP growth rate. Typical setting is $\tanh(\text{gdp\_growth})$ .&#xd;

## 1.12 Datatypes

See Table 21.

Table 21: **List of attributes for ADTs.**

Name	Description
consumption_goods_offer	
int id	
double quality	
double price	
estimators_linear_regression	
int mall_id	
double intercept	
double regressor	
double variance	
consumption_request	
int worker_id	
int consumer_region_id	
int firm_id	
double quantity	
mall_info	
int mall_id	
double critical_stock	
double current_stock	
mall_quality_price_info	
int mall_id	
int firm_id	
int mall_region_id	
double quality	
double price	
int available	
mall_stock	
int firm_id	

*Continued on next page*

Table 21 – continued from previous page

Name	Description
int region_id	
double stock	
double price	
double quality	
double previous_price	
delivery_volume_per_mall	
int mall_id	
double quantity	
double price	
double quality	
logit_firm_id	
double logit	
int firm_id	
sales_in_mall	
int firm_id	
double sales	
ordered_quantity	
int firm_id	
double quantity	
double price	
received_quantities	
int firm_id	
double quantity	
sold_quantities_per_mall	
int mall_id	
double sold_quantity	
int stock_empty	

*Continued on next page*

Table 21 – continued from previous page

Name	Description
double estimated_demand	
data_type_sales int period double sales	Sales in that mall in the certain period.
sales_statistics int mall_id data_type_sales_array sales	A lower array that stores the sales of the last periods for the mall.
financing_capital double financing_per_month int nr_periods_before_repayment	
temporary_sales_statistics int mall_id int period double sales	Sales in the mall.
potential_lender int bank_name int contacted	If the bank has been contacted (1) or not (0).
account_item int id double payment_account	Value in the account.
debt_item int bank_id double loan_value double interest_rate double installment_amount double var_per_installment	The number of periods left before full repayment of the loan is due.

*Continued on next page*

Table 21 – continued from previous page

Name	Description
double residual_var	
double bad_debt	
int nr_periods_before_repayment	
Order	
int issuer	
int quantity	
double price	
int assetId	
Belief	
int asset_id	
double expectedPriceReturns	
double expectedTotalReturns	
double expectedCashFlowYield	
double volatility	
double expectedEarning	
double expectedEarningPayout	
double last_price	
double utility	
Stock	
int id	
int nrOutStandingShares	
int index	
double prices	
double returns	
Bond	
int id	
int nr_outstanding	
int quantity	

*Continued on next page*

Table 21 – continued from previous page

Name	Description
double face_value	
double nominal_yield	
int maturity_day	
int issue_day	
double yield2maturity	
double prices	
int index	
double returns	
Asset	
int id	
int quantity	
double lastPrice	
ClearingMechanism	
double lastPrice	
int quantity	
Order_array sellOrders	
Order_array buyOrders	
double_array prices	
employee	
int id	
int region_id	
double wage	
int general_skill	
double specific_skill	
vacancy	
int firm_id	
int region_id	
double wage_offer	

*Continued on next page*

Table 21 – continued from previous page

Name	Description
job_application	
int worker_id	
int region_id	
int general_skill	
double specific_skill	
job_offer	
int firm_id	
int region_id	
double wage_offer	
logit	
double logit_value	
int worker_id	
int general_skill	
household_data	
int region_id	
int no_households	
int no_households_skill_1	
int no_households_skill_2	
int no_households_skill_3	
int no_households_skill_4	
int no_households_skill_5	
int employed	
int employed_skill_1	
int employed_skill_2	
int employed_skill_3	
int employed_skill_4	
int employed_skill_5	
int unemployed	

*Continued on next page*



Table 21 – continued from previous page

Name	Description
double unemployment_rate	
double unemployment_rate_skill_1	
double unemployment_rate_skill_2	
double unemployment_rate_skill_3	
double unemployment_rate_skill_4	
double unemployment_rate_skill_5	
double average_wage	
double average_wage_skill_1	
double average_wage_skill_2	
double average_wage_skill_3	
double average_wage_skill_4	
double average_wage_skill_5	
double average_s_skill	
double average_s_skill_1	
double average_s_skill_2	
double average_s_skill_3	
double average_s_skill_4	
double average_s_skill_5	
firm_data	
int region_id	
int no_firms	
int vacancies	
int employees	
int employees_skill_1	
int employees_skill_2	
int employees_skill_3	
int employees_skill_4	
int employees_skill_5	
double average_wage	

*Continued on next page*

Table 21 – continued from previous page

Name	Description
double average_wage_skill_1	
double average_wage_skill_2	
double average_wage_skill_3	
double average_wage_skill_4	
double average_wage_skill_5	
double average_s_skill	
double average_s_skill_1	
double average_s_skill_2	
double average_s_skill_3	
double average_s_skill_4	
double average_s_skill_5	
double total_earnings	
double total_debt	
double total_assets	
double total_equity	
double average_debt_earnings_ratio	
double average_debt_equity_ratio	
double labour_share_ratio	
double monthly_sold_quantity	
double monthly_output	
double monthly_revenue	
double monthly_planned_output	
double monthly_investment_value	
double investment_gdp_ratio	
double gdp	
double cpi	
double cpi_last_month	
int no_firm_births	
int no_firm_deaths	
double productivity_progress	

*Continued on next page*

Table 21 – continued from previous page

Name	Description
double productivity	
region_data_item	Number of firm deaths
double cpi	
double cpi_last_month	
double gdp	
double output	
int employment	
double unemployment_rate	
double unemployment_rate_skill_1	
double unemployment_rate_skill_2	
double unemployment_rate_skill_3	
double unemployment_rate_skill_4	
double unemployment_rate_skill_5	
double average_wage	
int no_firms	
int no_firm_births	
int no_firm_deaths	
history_item	In the history item we store the array region_data with data for all regions.
double cpi	
double gdp	
double output	
int employment	
double unemployment_rate	
double unemployment_rate_skill_1	
double unemployment_rate_skill_2	
double unemployment_rate_skill_3	
double unemployment_rate_skill_4	
double unemployment_rate_skill_5	

*Continued on next page*

Table 21 – continued from previous page

Name	Description
double average_wage	
int no_firms	
int no_firm_births	
int no_firm_deaths	
region_data_item_array	region_data
firm_stocks_adt	
double payment_account	
double total_value_local_inventory	
double total_value_capital_stock	
double total_debt	
int current_shares_outstanding	
double total_assets	
double total_liabilities	
firm_flows_adt	
double cum_revenue	
double labour_costs	
double capital_costs	
double tax_payment	
double total_debt_installment_payment	
double total_interest_payment	
double total_dividend_payment	
double total_income	
double total_expenses	
household_stocks_adt	
double payment_account	
double gov_bond_holdings	
int nr_gov_bonds	
int nr_firm_shares	
double total_assets	

*Continued on next page*

Table 21 – continued from previous page

Name	Description
double total_liabilities	
household_flows_adt	
double wage	
double gov_interest	
double stock_sales	
double cum_total_dividends	
double monthly_consumption_expenditure	
double tax_payment	
double stock_purchases	
double total_income	
double total_expenses	
igfirm_stocks_adt	
double payment_account	
double total_debt	
int current_shares_outstanding	
double total_assets	
double total_liabilities	
igfirm_flows_adt	
double cum_revenue	
double labour_costs	
double energy_costs	
double tax_payment	
double total_debt_installment_payment	
double total_interest_payment	
double total_dividend_payment	
double total_income	
double total_expenses	
bank_stocks_adt	

*Continued on next page*

Table 21 – continued from previous page

Name	Description
double cash	
double total_credit	
double deposits	
double ecb_debt	
double total_assets	
double total_liabilities	
bank_flows_adt	
double firm_loan_installments	
double firm_interest_payments	
double firm_loan_issues	
double ecb_interest_payment	
double dividend_payment	
double tax_payment	
double total_income	
double total_expenses	
gov_stocks_adt	
double payment_account	
double value_bonds_outstanding	
int nr_bonds_outstanding	
double total_assets	
double total_liabilities	
gov_flows_adt	
double monthly_tax_revenues	
double total_bond_financing	
double monthly_investment_expenditure	
double monthly_consumption_expenditure	
double monthly_benefit_payment	
double monthly_subsidy_payment	
double monthly_transfer_payment	

*Continued on next page*

Table 21 – continued from previous page

Name	Description
double monthly_bond_interest_payment	
double total_income	
double total_expenses	
ecb_stocks_adt	
double gov_bond_holdings	
int nr_gov_bonds	
double total_ecb_debt	
double payment_account_private_sector	
double payment_account_public_sector	
double fiat_money	
double total_assets	
double total_liabilities	
ecb_flows_adt	
double bank_interest	
double gov_interest	
double gov_bond_purchase	
double dividend_payment	
double total_income	
double total_expenses	
firm_balance_sheet_adt	
firm_stocks_adt	stocks
firm_flows_adt	flows
household_balance_sheet_adt	
household_stocks_adt	stocks
household_flows_adt	flows
igfirm_balance_sheet_adt	
igfirm_stocks_adt	stocks
igfirm_flows_adt	flows

*Continued on next page*

Table 21 – continued from previous page

Name	Description
bank_balance_sheet_adt	
bank_stocks_adt	stocks
bank_flows_adt	flows
gov_balance_sheet_adt	
gov_stocks_adt	stocks
gov_flows_adt	flows
ecb_balance_sheet_adt	
ecb_stocks_adt	stocks
ecb_flows_adt	flows



## Index

Asset, 87  
Bank\_account\_update\_deposits, 47  
Bank\_accounting, 47  
Bank\_communicate\_identity, 47  
Bank\_decide\_credit\_conditions, 47  
Bank\_give\_loan, 47  
Bank\_idle, 47  
Bank\_read\_policy\_announcements, 47  
Bank\_read\_policy\_rate, 47  
Bank\_receive\_installment, 47  
Bank\_send\_accountInterest, 47  
Bank\_send\_dividend\_payment, 47  
Bank\_set\_quantities\_zero, 47  
Bank\_update\_ecb\_account, 47  
Belief, 86  
Bond, 86  
Central\_Bank\_monetary\_policy, 58  
Central\_Bank\_read\_account\_update, 58  
Central\_Bank\_read\_fiat\_money\_requests, 58  
ClearingHouse\_receive\_info, 61  
ClearingHouse\_receive\_orders\_and\_run, 61  
ClearingHouse\_send\_asset\_information, 61  
ClearingMechanism, 87  
Eurostat\_calculate\_data, 43  
Eurostat\_compute\_growth\_rates\_monthly, 43  
Eurostat\_compute\_growth\_rates\_quarterly, 43  
Eurostat\_idle, 43  
Eurostat\_initialization, 43  
Eurostat\_measure\_recession, 43  
Eurostat\_send\_data\_to\_government, 43  
Eurostat\_send\_data, 43  
Eurostat\_store\_history\_monthly, 43  
Eurostat\_store\_history\_quarterly, 43  
Firm\_ask\_loan, 13  
Firm\_bankruptcy\_idle\_counter, 14  
Firm\_bankruptcy\_illiquidity\_procedure, 14  
Firm\_bankruptcy\_insolvency\_procedure, 14  
Firm\_calc\_input\_demands, 12  
Firm\_calc\_pay\_costs, 12  
Firm\_calc\_production\_quantity\_2, 12  
Firm\_calc\_production\_quantity, 12  
Firm\_calc\_revenue, 12  
Firm\_calculate\_specific\_skills\_and\_wage\_offer, 15  
Firm\_check\_financial\_and\_bankruptcy\_state, 13  
Firm\_compute\_and\_send\_stock\_orders, 13, 14  
Firm\_compute\_balance\_sheet, 13  
Firm\_compute\_dividends, 13  
Firm\_compute\_financial\_payments, 13  
Firm\_compute\_income\_statement, 13  
Firm\_compute\_mean\_wage\_specific\_skills, 17  
Firm\_compute\_sales\_statistics, 12  
Firm\_compute\_total\_financial\_payments, 13  
Firm\_compute\_total\_liquidity\_needs, 13  
Firm\_execute\_financial\_payments, 14  
Firm\_execute\_production, 12  
Firm\_finish\_labour\_market\_first\_round, 16  
Firm\_get\_loan, 13  
Firm\_idle, 15, 17  
Firm\_in\_financial\_crisis, 14  
Firm\_initialize\_mall\_arrays, 17  
Firm\_not\_in\_bankruptcy, 14  
Firm\_read\_job\_applications\_send\_job\_offer\_or\_rejection\_2, 16  
Firm\_read\_job\_applications\_send\_job\_offer\_or\_rejection, 15  
Firm\_read\_job\_quitting\_2, 16, 17  
Firm\_read\_job\_quitting, 15, 16  
Firm\_read\_job\_responses\_2, 16  
Firm\_read\_job\_responses, 15  
Firm\_read\_policy\_announcements, 17  
Firm\_read\_stock\_transactions, 13, 14  
Firm\_receive\_capital\_goods, 12  
Firm\_receive\_data, 17  
Firm\_receive\_stock\_info, 15  
Firm\_reset\_bankruptcy\_flags, 15  
Firm\_send\_capital\_demand, 12  
Firm\_send\_data\_to\_Eurostat, 17  
Firm\_send\_goods\_to\_mall, 12  
Firm\_send\_id\_to\_malls, 17  
Firm\_send\_info, 15  
Firm\_send\_payments\_to\_bank, 17  
Firm\_send\_random\_redundancies, 17  
Firm\_send\_redundancies, 15  
Firm\_send\_subsidy\_notification, 14  
Firm\_send\_transfer\_notification, 14  
Firm\_send\_vacancies\_2, 16  
Firm\_send\_vacancies, 15  
Firm\_set\_bankruptcy\_illiquidity, 14  
Firm\_set\_bankruptcy\_insolvency, 13  
Firm\_set\_quantities\_zero, 12

Firm\_start\_labour\_market, 16  
 Firm\_update\_specific\_skills\_of\_workers, 13  
 Firm\_update\_wage\_offer\_2, 17  
 Firm\_update\_wage\_offer, 16  
 Government\_bonds\_issuing\_decision, 54  
 Government\_initialization, 53  
 Government\_monthly\_budget\_accounting, 54  
 Government\_monthly\_resetting, 53  
 Government\_orders\_issuing, 53  
 Government\_pays\_coupons, 53  
 Government\_read\_data\_from\_Eurostat, 54  
 Government\_read\_policy\_rate, 53  
 Government\_read\_subsidy\_notifications, 53  
 Government\_read\_tax\_payments, 53  
 Government\_read\_transfer\_notifications, 53  
 Government\_read\_unemployment\_benefit\_notifications, 53  
 Government\_receive\_info\_bond, 53  
 Government\_resolve\_unsold\_bonds, 54  
 Government\_send\_account\_update, 54  
 Government\_send\_info\_bond, 53  
 Government\_send\_policy\_announcements, 53  
 Government\_set\_policy, 54  
 Government\_update\_its\_portfolio, 53  
 Government\_yearly\_budget\_accounting, 54  
 Government\_yearly\_resetting, 54  
 Household\_UNEMPLOYED\_read\_job\_vacancies\_and\_send\_applications\_2, 25  
 Household\_UNEMPLOYED\_read\_job\_vacancies\_and\_send\_applications, 25  
 Household\_bond\_beliefs\_formation, 24  
 Household\_determine\_consumption\_budget, 26  
 Household\_finish\_labour\_market, 25  
 Household\_handle\_leftover\_budget, 24  
 Household\_idle, 24–26  
 Household\_initialization, 26  
 Household\_rank\_and\_buy\_goods\_1, 24  
 Household\_rank\_and\_buy\_goods\_2, 24  
 Household\_read\_application\_rejection\_update\_wage\_reservation\_2, 25  
 Household\_read\_application\_rejection\_update\_wage\_reservation, 25  
 Household\_read\_data\_from\_Eurostat, 26  
 Household\_read\_firing\_messages, 25  
 Household\_read\_job\_offers\_send\_response\_2, 25  
 Household\_read\_job\_offers\_send\_response, 25  
 Household\_read\_policy\_announcements, 26  
 Household\_receive\_data, 26  
 Household\_receive\_dividends, 25  
 Household\_receive\_goods\_read\_rationing\_2, 24  
 Household\_receive\_goods\_read\_rationing, 24  
 Household\_receive\_info\_interest\_from\_bank, 24  
 Household\_receive\_wage, 26  
 Household\_receives\_payment\_coupons, 24  
 Household\_revises\_expected\_portfolio, 24  
 Household\_select\_strategy, 24  
 Household\_send\_account\_update, 24  
 Household\_send\_data\_to\_Eurostat, 26  
 Household\_send\_orders, 25  
 Household\_send\_subsidy\_notification, 26  
 Household\_send\_tax\_payment, 26  
 Household\_send\_transfer\_notification, 26  
 Household\_send\_unemployment\_benefit\_notification, 26  
 Household\_set\_values\_zero, 24  
 Household\_stock\_beliefs\_formation, 24  
 Household\_update\_its\_portfolio, 25  
 Household\_update\_specific\_skills, 26  
 IGfirm\_dividend\_payment, 33  
 IGfirm\_idle, 33  
 IGfirm\_pay\_taxes, 33  
 IGfirm\_read\_policy\_announcements, 33  
 IGfirm\_receive\_payment, 33  
 IGfirm\_send\_capital\_good, 33  
 IGfirm\_send\_payment\_account\_to\_bank, 33  
 IGfirm\_send\_quality\_price\_info, 33  
 IGfirm\_update\_productivity\_price, 33  
 IGfirm\_id, 68  
 Mall\_initialize\_firm\_arrays, 29  
 Mall\_pay\_firm, 29  
 Mall\_read\_insolvency\_bankruptcy, 29  
 Mall\_reset\_export\_data, 29  
 Mall\_send\_export\_data, 29  
 Mall\_send\_id\_to\_firms, 29  
 Mall\_send\_quality\_price\_info\_1, 29  
 Mall\_update\_mall\_stocks\_sales\_rationing\_1, 29  
 Mall\_update\_mall\_stocks\_sales\_rationing\_2, 29  
 Mall\_update\_mall\_stock, 29  
 Order, 86  
 Stock, 86  
 account\_item, 85  
 accounts\_banks, 56  
 accounts\_govs, 56  
 active, 11  
 actual\_cap\_price, 5  
 adaption\_delivery\_volume, 80

adaption\_production\_volume\_due\_to\_insufficient\_finance, 6  
 age, 11, 32, 74  
 alfa, 45  
 alpha, 80  
 amount\_offered\_credit, 66  
 annual\_growth\_rates\_monthly, 39  
 annual\_growth\_rates\_quarterly, 39  
 assetUtilities, 21  
 assetWeights, 21  
 asset\_id, 67, 68  
 assetsowned, 21  
 assets, 60  
 available, 64  
 average\_debt\_earnings\_ratio, 38  
 average\_debt\_equity\_ratio, 38  
 average\_g\_skill, 10  
 average\_s\_skill\_1, 36, 73  
 average\_s\_skill\_2, 36, 73  
 average\_s\_skill\_3, 36, 74  
 average\_s\_skill\_4, 36, 74  
 average\_s\_skill\_5, 37, 74  
 average\_s\_skill\_of\_1, 10  
 average\_s\_skill\_of\_2, 10  
 average\_s\_skill\_of\_3, 10  
 average\_s\_skill\_of\_4, 10  
 average\_s\_skill\_of\_5, 10  
 average\_s\_skill, 36, 73  
 average\_specific\_skills, 63  
 average\_wage\_skill\_1, 36  
 average\_wage\_skill\_2, 36  
 average\_wage\_skill\_3, 36  
 average\_wage\_skill\_4, 36  
 average\_wage\_skill\_5, 36  
 average\_wage, 36, 73  
 backwardWindow, 21  
 bad\_debt, 67  
 bank\_balance\_sheet\_adt, 96  
 bank\_dividend\_rate, 45  
 bank\_flows\_adt, 94  
 bank\_gamma, 45  
 bank\_id, 5, 19, 31, 63, 66, 67  
 bank\_interest\_amount, 67  
 bank\_interest, 57  
 bank\_lambda, 45  
 bank\_stocks\_adt, 93  
 bankruptcy\_idle\_counter, 11  
 bankruptcy\_illiquidity\_state, 11  
 bankruptcy\_insolvency\_state, 11  
 bankruptcy\_state, 11  
 beliefs, 20  
 beta, 80  
 bins, 21  
 bond\_holdings\_value, 56  
 bonds\_newissue\_discount, 79  
 bond, 49, 68  
 budget\_balance\_forecast, 51  
 calc\_capital\_costs, 7  
 calc\_production\_costs, 7  
 cap\_good\_price, 68  
 cap\_productivity, 68  
 capital\_bill, 69  
 capital\_costs, 7, 74  
 capital\_financing, 7  
 capital\_good\_delivery\_volume, 69  
 capital\_good\_demand, 68  
 capital\_good\_price, 31, 69  
 carrol\_consumption\_parameter, 80  
 cash\_on\_hand, 21  
 cash, 45, 56  
 chartistWeight, 21  
 clearingmechanism, 60  
 commuting\_costs\_price\_level\_weight, 20  
 const\_bankruptcy\_idle\_period, 78  
 const\_dividend\_earnings\_ratio, 79  
 const\_energy\_shock\_intensity, 80  
 const\_firm\_leverage, 78  
 const\_income\_tax\_rate, 78  
 const\_installment\_periods, 78  
 const\_number\_of\_banks, 78  
 const\_wage\_wealth\_ratio, 78  
 consumption\_budget\_in\_month, 19  
 consumption\_budget, 19  
 consumption\_goods\_offer, 83  
 consumption\_request, 83  
 country\_wide\_mean\_wage, 51  
 couponperiodicitynrmmonths, 79  
 coupon, 68  
 cpi, 5, 38, 75  
 credit\_amount\_taken, 66  
 credit\_refunded, 67  
 critical\_earnings\_per\_share\_ratio, 9  
 critical\_price\_earnings\_ratio, 8  
 cum\_energy\_costs, 32  
 cum\_revenue, 6, 74  
 cum\_total\_dividends, 20

cum\_total\_sold\_quantity, 6, 74  
 cumulated\_deficit, 52  
 current\_dividend\_per\_earnings, 8  
 current\_dividend\_per\_share, 8, 31, 67  
 current\_earnings\_per\_share, 8  
 current\_mall\_stocks, 7  
 current\_mean\_specific\_skills\_employer, 20  
 current\_productivity\_employer, 20  
 current\_share\_price, 8, 46  
 current\_shares\_outstanding, 10, 45  
 current\_stock, 28, 65  
 data\_type\_sales, 85  
 day\_of\_month\_receive\_benefit, 22  
 day\_of\_month\_receive\_income, 19  
 day\_of\_month\_to\_act, 5, 19, 31, 46, 49  
 day\_of\_week\_to\_act, 19  
 days\_in\_month, 79  
 days\_per\_month, 78  
 debt\_earnings\_ratio, 8  
 debt\_equity\_ratio, 8  
 debt\_item, 85  
 debt\_period, 45  
 debt\_rescaling\_factor, 79  
 delivery\_prob\_if\_critical\_stock\_0, 80  
 delivery\_volume\_per\_mall, 84  
 delivery\_volume, 6  
 demand\_capital\_stock, 6  
 deposits\_rate, 45  
 deposits, 46  
 depreciation\_rate, 80  
 dividend\_payment, 32, 56  
 dividend\_per\_share, 46  
 dividend, 68  
 earnings\_payout, 10, 68  
 earnings\_per\_day, 31  
 earnings\_per\_share\_ratio\_growth, 8  
 earnings\_per\_share, 9  
 earnings, 7, 31, 68  
 ebit, 7  
 ecb\_balance\_sheet\_adt, 96  
 ecb\_debt, 45, 63  
 ecb\_deposits, 56  
 ecb\_flows\_adt, 95  
 ecb\_interest\_payment, 46  
 ecb\_interest\_rate, 45, 56  
 ecb\_stocks\_adt, 95  
 employed\_skill\_1, 35  
 employed\_skill\_2, 35  
 employed\_skill\_3, 35  
 employed\_skill\_4, 35  
 employed\_skill\_5, 35  
 employed, 35  
 employee\_firm\_id, 22  
 employees\_needed, 11  
 employees\_skill\_1, 73  
 employees\_skill\_2, 73  
 employees\_skill\_3, 73  
 employees\_skill\_4, 73  
 employees\_skill\_5, 73  
 employees, 10, 73  
 employee, 87  
 employer\_region\_id, 22  
 employment\_status, 74  
 energy\_costs\_per\_day, 31  
 energy\_price\_markup, 31  
 energy\_shock\_end, 80  
 energy\_shock\_frequency, 80  
 energy\_shock\_start, 79  
 equity, 9, 45, 56, 66, 68, 74  
 estimators\_linear\_regression, 83  
 excess\_weekly\_budget, 20  
 expenditures, 20  
 export\_previous\_value\_matrix, 28, 41  
 export\_previous\_value, 75  
 export\_value\_matrix, 28, 41  
 export\_value, 75  
 export\_volume\_matrix, 28, 41  
 export\_volume, 75  
 external\_financial\_needs, 9, 66  
 fiat\_money\_banks, 56  
 fiat\_money\_govs, 56  
 fiat\_money, 56  
 financial\_crisis\_state, 11  
 financial\_liquidity\_needs, 9  
 financial\_resources\_for\_production, 7  
 financing\_capital, 85  
 firm\_age\_distribution\_1\_period\_lag, 39  
 firm\_age\_distribution\_2\_period\_lag, 40  
 firm\_age\_distribution\_multiperiod, 39  
 firm\_age\_distribution, 39  
 firm\_average\_productivity\_progress, 41  
 firm\_average\_productivity, 42  
 firm\_average\_s\_skill\_1, 38  
 firm\_average\_s\_skill\_2, 38  
 firm\_average\_s\_skill\_3, 38  
 firm\_average\_s\_skill\_4, 38

firm\_average\_s\_skill\_5, 38  
 firm\_average\_s\_skill, 37  
 firm\_average\_wage\_skill\_1, 37  
 firm\_average\_wage\_skill\_2, 37  
 firm\_average\_wage\_skill\_3, 37  
 firm\_average\_wage\_skill\_4, 37  
 firm\_average\_wage\_skill\_5, 37  
 firm\_average\_wage, 37  
 firm\_balance\_sheet\_adt, 95  
 firm\_birth\_rate, 40  
 firm\_data, 89  
 firm\_death\_rate, 40  
 firm\_flows\_adt, 92  
 firm\_id, 63–73, 75  
 firm\_interest\_payments, 46  
 firm\_loan\_installments, 46  
 firm\_loan\_issues, 46  
 firm\_planning\_horizon, 80  
 firm\_productivity\_last\_year, 7  
 firm\_productivity\_progress, 7, 74  
 firm\_productivity, 7, 74  
 firm\_region, 74  
 firm\_revenues, 28  
 firm\_stocks\_adt, 92  
 firm\_subsidy\_pct, 50, 72  
 firm\_transfer\_payment, 50, 72  
 firm\_wage\_offer\_for\_skill\_1, 69  
 firm\_wage\_offer\_for\_skill\_2, 69  
 firm\_wage\_offer\_for\_skill\_3, 69  
 firm\_wage\_offer\_for\_skill\_4, 69  
 firm\_wage\_offer\_for\_skill\_5, 69  
 flag\_consumption\_shifting, 20  
 forwardWindow, 21  
 fraction\_reserved\_for\_delayed\_payments, 6  
 fundamentalWeight, 21  
 fundamental\_return\_weight\_min, 79  
 gamma\_const, 80  
 gdp\_forecast, 51  
 gdp\_fraction\_consumption, 49  
 gdp\_fraction\_investment, 49  
 gdp\_growth, 51  
 gdp, 39, 51, 75  
 general\_skill, 21, 70, 71, 74  
 gov\_balance\_sheet\_adt, 96  
 gov\_bond\_purchases, 22  
 gov\_bond\_purchase, 57  
 gov\_flows\_adt, 94  
 gov\_id, 5, 19, 28, 31, 45, 72, 73  
 gov\_interest\_rate, 50  
 gov\_interest, 22, 57  
 gov\_policy\_gdp\_fraction\_consumption, 81  
 gov\_policy\_gdp\_fraction\_investment, 81  
 gov\_policy\_money\_financing\_fraction, 81  
 gov\_policy\_switch\_quantitative\_easing, 81  
 gov\_policy\_unemployment\_benefit\_pct, 81  
 gov\_stocks\_adt, 94  
 government\_id, 68  
 hh\_subsidy\_pct, 50, 72  
 hh\_transfer\_payment, 50, 72  
 history\_item, 91  
 history\_monthly, 39  
 history\_quarterly, 39  
 holdingPeriodToForwardW, 21  
 household\_balance\_sheet\_adt, 95  
 household\_data, 88  
 household\_flows\_adt, 93  
 household\_id, 65, 74  
 household\_region, 75  
 household\_stocks\_adt, 92  
 idle, 12–15, 17, 24–26, 29, 43, 47, 53, 54, 58  
 id, 5, 19, 28, 31, 35, 45, 49, 56, 60, 63, 65, 68  
 igfirm\_balance\_sheet\_adt, 95  
 igfirm\_flows\_adt, 93  
 igfirm\_stocks\_adt, 93  
 inflation\_rate, 52  
 inflation, 75  
 innovation\_probability, 80  
 installment\_amount, 66  
 interest\_amount, 67  
 interest, 67  
 inv\_inertia, 80  
 investment\_gdp\_ratio, 42  
 job\_application, 88  
 job\_offer, 88  
 labour\_costs, 7  
 labour\_share\_ratio, 38  
 lambda, 80  
 last\_day\_of\_month\_to\_act, 5  
 last\_income, 20  
 last\_labour\_income, 21  
 last\_net\_profits, 32  
 last\_planned\_production\_quantities, 7  
 limit\_price, 67  
 linear\_regression\_estimators, 6  
 list\_of\_regions, 49  
 loan\_request\_message\_found, 45

loan\_total\_var, 66  
 loans, 9  
 logit\_firm\_id, 84  
 logit\_parameter\_general\_skills, 81  
 logit\_parameter\_specific\_skills, 81  
 logit, 88  
 lossaversion, 21  
 lower\_bound\_firing, 81  
 mall\_completely\_sold\_out, 19  
 mall\_id, 63–65, 74, 76  
 mall\_info, 83  
 mall\_quality\_price\_info, 83  
 mall\_region\_id, 63, 64  
 mall\_stock, 83  
 malls\_sales\_statistics, 6  
 mark\_up, 80  
 max\_firm\_creation, 41  
 mean\_income, 19  
 mean\_specific\_skills, 5  
 mean\_wage, 5, 75  
 min\_vacancy, 80  
 monthly\_benefit\_payment, 49  
 monthly\_bond\_interest\_income, 23  
 monthly\_bond\_interest\_payment, 50  
 monthly\_budget\_balance, 51  
 monthly\_consumption\_budget, 51  
 monthly\_consumption\_expenditure, 23, 51  
 monthly\_expenditure, 52  
 monthly\_growth\_rates, 39  
 monthly\_income, 52  
 monthly\_investment\_budget, 51  
 monthly\_investment\_expenditure, 51  
 monthly\_investment\_value, 39  
 monthly\_output, 39  
 monthly\_planned\_output, 39  
 monthly\_revenue, 39  
 monthly\_sold\_quantity, 39  
 monthly\_subsidy\_payment, 50  
 monthly\_tax\_revenues, 49  
 monthly\_transfer\_payment, 50  
 needed\_capital\_stock, 5  
 neighboring\_region\_ids, 19  
 net\_earnings, 8, 74  
 net\_profit, 31  
 no\_employees\_skill\_1, 10, 37  
 no\_employees\_skill\_2, 10, 37  
 no\_employees\_skill\_3, 10, 37  
 no\_employees\_skill\_4, 10, 37  
 no\_employees\_skill\_5, 10, 37  
 no\_employees, 10, 37  
 no\_firm\_births, 39  
 no\_firm\_deaths, 39  
 no\_firms, 37  
 no\_households\_skill\_1, 35  
 no\_households\_skill\_2, 35  
 no\_households\_skill\_3, 35  
 no\_households\_skill\_4, 35  
 no\_households\_skill\_5, 35  
 no\_regions\_per\_gov, 81  
 no\_vacancies, 37  
 nominal\_value, 73  
 nr\_gov\_bonds, 56  
 num\_households, 35  
 num\_unemployed, 51  
 number\_applications, 21  
 number\_of\_banks\_asked, 7  
 number\_of\_banks\_to\_apply, 78  
 offered\_consumption\_volume, 65  
 on\_the\_job\_search, 21  
 order\_quantity, 19  
 ordered\_quantity, 84  
 output, 5, 74  
 outstanding\_shares, 31  
 partition\_id, 5, 19, 28, 31, 35, 45, 49, 56, 60  
 payment\_account, 5, 19, 31, 49, 63  
 payment, 63  
 pendingOrders, 21  
 pending\_order, 49  
 planned\_delivery\_volume, 7  
 planned\_output, 5, 74  
 planned\_production\_costs, 6  
 planned\_production\_quantity, 5  
 planned\_value\_capital\_stock, 7  
 policy\_exp1, 78  
 policy\_exp\_energy\_shock, 78  
 policy\_exp\_stabilization, 78  
 policy\_rate\_value, 66  
 potential\_lender, 85  
 previous\_dividend\_per\_earnings, 8  
 previous\_dividend\_per\_share, 8  
 previous\_earnings\_per\_share, 8  
 previous\_net\_earnings, 8  
 previous\_price, 64  
 previous\_shares\_outstanding, 9  
 price\_earnings\_ratio, 8  
 price\_index\_base\_period, 20

price\_index, 20, 39  
 price\_last\_month, 6, 74  
 price, 6, 64, 68, 74  
 print\_debug\_afm, 78  
 print\_debug\_andrea, 78  
 print\_debug\_consumption, 78  
 print\_debug\_credit, 78  
 print\_debug\_exp1, 78  
 print\_debug\_file\_exp1, 78  
 print\_debug\_file\_exp2, 78  
 print\_debug\_gov, 78  
 print\_debug, 78  
 print\_log, 78  
 production\_costs, 6  
 production\_liquidity\_needs, 9  
 production\_quantity, 5  
 productivity\_progress, 75, 81  
 productivity, 31, 63, 69  
 profits, 45  
 proposed\_interest\_rate, 66  
 quality, 6, 63, 64  
 quantil\_normal\_distribution, 80  
 quantity, 64, 65, 67, 68, 73  
 quarterly\_growth\_rates, 39  
 randomWeight, 21  
 rationed, 19, 65  
 received\_dividend, 20  
 received\_quantities, 84  
 received\_quantity, 19  
 recession\_duration, 41  
 recession\_started, 41  
 region\_cost, 80  
 region\_data\_item, 91  
 region\_export\_value, 41  
 region\_export\_volume, 41  
 region\_firm\_data, 38  
 region\_household\_data, 38  
 region\_id, 5, 19, 28, 31, 35, 45, 49, 56, 60, 64, 65, 69–71, 73–75  
 region\_import\_previous\_value, 41  
 region\_import\_value, 41  
 region\_import\_volume, 41  
 region\_mean\_wage, 23  
 region\_wide\_mean\_wage, 22  
 residual\_var, 67  
 retained\_earnings\_ratio, 8  
 revenue\_per\_day, 6, 31  
 revenue, 65  
 risk\_free\_rate, 20  
 sales\_in\_mall, 84  
 sales\_statistics, 85  
 set\_of\_lenders, 7  
 sold\_quantities\_per\_mall, 84  
 sold\_quantities, 6  
 sold\_quantity\_in\_calendar\_month, 6  
 specific\_skill\_1, 75  
 specific\_skill\_2, 75  
 specific\_skill\_3, 75  
 specific\_skill\_4, 75  
 specific\_skill\_5, 75  
 specific\_skills, 65  
 specific\_skill, 22, 70, 71, 74  
 stock\_empty, 65  
 stock\_purchases, 22  
 stock\_sales, 22  
 stock, 10, 68  
 strategy, 21  
 subsidy\_flag, 50  
 subsidy\_gdp\_ratio, 81  
 subsidy\_payment, 11, 23, 73  
 subsidy\_pct, 11, 22, 32  
 subsidy\_trigger\_off, 81  
 subsidy\_trigger\_on, 81  
 survival\_rate\_multiperiod\_1, 40  
 survival\_rate\_multiperiod\_2, 40  
 survival\_rate\_multiperiod, 41  
 survival\_rate, 40  
 switch\_datastorage, 35  
 symmetric\_shock, 79  
 target\_leverage\_ratio, 79  
 target\_liquidity\_ratio, 79  
 target\_savings\_rate, 80  
 tax\_payment, 8, 20, 31, 72  
 tax\_rate\_corporate, 7, 31, 45, 49, 72  
 tax\_rate\_hh\_capital, 20, 49, 72  
 tax\_rate\_hh\_labour, 20, 49, 72  
 tax\_rate\_vat, 8, 31, 49, 72  
 taxes, 46  
 technological\_frontier, 6  
 technology, 10  
 temporary\_sales\_statistics, 85  
 total\_assets, 9, 22, 38, 46, 52, 57, 74  
 total\_bond\_financing, 51  
 total\_capital\_depreciation\_units, 9  
 total\_capital\_depreciation\_value, 9  
 total\_credit, 45

total\_debt\_installment\_payment, 8  
 total\_debt, 9, 38, 51, 66, 74  
 total\_dividend\_payment, 8  
 total\_dividends, 46  
 total\_earnings, 38  
 total\_equity, 38  
 total\_expenses, 10, 22, 46, 57  
 total\_external\_financing\_obtained, 7  
 total\_financial\_needs, 9  
 total\_income, 9, 22, 46, 57  
 total\_interest\_payment, 8  
 total\_liabilities, 10, 22, 46, 52, 57  
 total\_money\_financing, 51  
 total\_payments, 9  
 total\_regions, 78  
 total\_sold\_quantity, 6  
 total\_supply, 6, 28, 74  
 total\_units\_capital\_stock, 9  
 total\_units\_local\_inventory, 7  
 total\_value\_capital\_stock, 9  
 total\_value\_local\_inventory, 9  
 trader\_id, 67, 68  
 trading\_activity, 79  
 transfer\_payment, 11, 22, 32  
 unemployed, 35  
 unemployment\_benefit\_pct, 22, 49, 72  
 unemployment\_payment, 22, 72  
 unemployment\_rate\_skill\_1, 36  
 unemployment\_rate\_skill\_2, 36  
 unemployment\_rate\_skill\_3, 36  
 unemployment\_rate\_skill\_4, 36  
 unemployment\_rate\_skill\_5, 36  
 unemployment\_rate, 35, 52, 75  
 unit\_costs, 5  
 upper\_bound\_firing, 81  
 vacancies, 10, 73  
 vacancy, 87  
 value\_at\_risk, 45, 66  
 var\_per\_installment, 67  
 wage\_offer\_for\_skill\_1, 11  
 wage\_offer\_for\_skill\_2, 11  
 wage\_offer\_for\_skill\_3, 11  
 wage\_offer\_for\_skill\_4, 11  
 wage\_offer\_for\_skill\_5, 11  
 wage\_offer, 10, 70, 71  
 wage\_reservation\_update, 80  
 wage\_reservation, 21  
 wage\_update, 80  
 wage, 21, 74  
 wealth\_income\_ratio\_actual, 20  
 wealth\_income\_ratio\_target, 20  
 wealth, 20  
 week\_of\_month, 19  
 weekly\_budget, 19  
 worker\_id, 63–65, 70–72  
 yearly\_benefit\_payment, 50  
 yearly\_bond\_interest\_payment, 50  
 yearly\_budget\_balance, 51  
 yearly\_consumption\_budget, 52  
 yearly\_consumption\_expenditure, 50  
 yearly\_expenditure\_budget, 51  
 yearly\_expenditure, 50  
 yearly\_income\_forecast, 51  
 yearly\_income, 50  
 yearly\_investment\_budget, 52  
 yearly\_investment\_expenditure, 50  
 yearly\_subsidy\_payment, 50  
 yearly\_tax\_revenues, 49  
 yearly\_transfer\_payment, 50