

A stock–flow consistent approach to modelling: potentials and challenges

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- 1 Origin of Stock-Flow Consistent (SFC) models
- 2 Central features
- 3 Potentials
- 4 Practical challenges
- 5 The way forward



Origin of SFC models



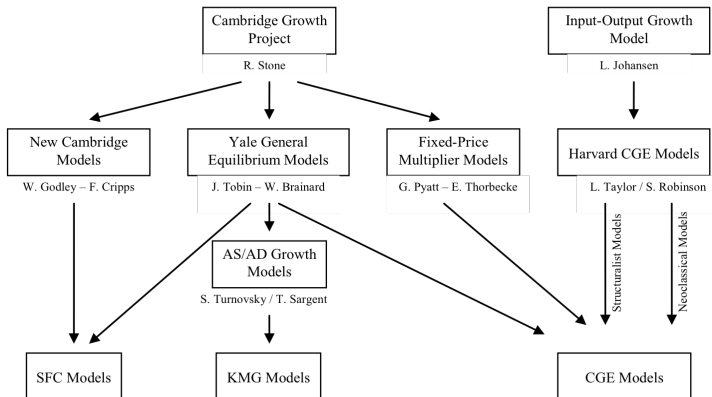
Origin of SFC models

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Family tree of accounting models:



Origin of SFC models

- 1 The most pioneering contribution came from Wynne Godley.



Origin of SFC models

- 1 The most pioneering contribution came from Wynne Godley.
- 2 A detailed analyses of the SFC approach can be found in the book, *"Monetary Economics - An Integrated Approach to Credit, Money, Income, Production and Wealth"* written by **Wynne Godley** and **Marc Lavoie**.



Features of SFC models



Features of SFC models

1. **Stock** and **Flow** accounting



Features of SFC models

1. **Stock** and **Flow** accounting

2. Behavioural equations (structure of the model)



Stock and Flow accounting



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The balance sheet accounting ensures:

- 1 Someone's (financial) asset is someone's (financial) liability.
- 2 Someone's wealth is someone's debt.



Example of Transactions in the Danish economy



Example of Transactions in the Danish economy

Non-financial transactions 2015	Household		Government		Financial corp.		Non-financial corp.		ROW		
	Current	Capital	Current	Capital	Current	Capital	Current	Capital	Current	Capital	
Cons	-955 867						955 867				0
Gov			-520 797				520 797				0
Investment		-87 460		-73 292		-11 373	400 467	-228 342			0
Exports							1 119 546		-1 119 546		0
Imports							-969 507		969 507		0
[GDP]											2 027 170
Taxes			282 192				-285 510		3 319		1
Other taxes on production			47 698				-47 698				0
Subsidies D31			-17 786				17 905		-119		0
Subsidies D39			-23 308				30 593		-7 285		0
gross operating surplus	153 111		58 754		48628		-260493				0
Wages	1 038 827						-1 049 056		10 229		0
Property Income:	81 589		-12 118		28 338		-23 731		-74 078		0
Current taxes on income, wealth, etc.	-553 757		616 572		-10 359		-42 613		-9 844		-1
Social contributions	-165 900		20 195		145 022		0		683		0
Social benefits other than social transfers in kind	418 132		-352 425		-68 599		0		2 891		-1
Other current transfers	19 702		-37 106		-890		-20 357		38 651		0
Adjustment for the change in pension entitlements	76 423				-76 423						0
Savings	-112 260	112 260	-61 871	61 871	-65 717	65 717	-346 210	346 210	185 592	-185 592	0
Capital transfers		1 221		-19 469		-1 330		12 219		7 359	0
NP - Acquisitions less disposals of non-produced non-financial assets		-1 830		3 660		0		-1 667		-163	0
Net lending (+) / net borrowing (-) (from capital accounts)		24 192		-27 229		53 014		128 420		-178 397	



Example of Transactions in the Danish economy

Financial transactions	HH		Gov		FC		NFC		ROW	
	Δ ASSETS	Δ LIABILITIES	Δ ASSETS	Δ LIABILITIES	Δ ASSETS	Δ LIABILITIES	Δ ASSETS	Δ LIABILITIES	Δ ASSETS	Δ LIABILITIES
Monetary gold and special drawing rights (SDRs)				:	1430	1345			1344	1429
Currency and deposits	23782		-51882	606	-181259	-424489	-15645	0	-241865	-42986
Debt securities	-11026	-242	-3798	-81237	-316458	120939	226021	-7901	49452	-87367
Loans	0	46819	529	6699	19662	-77555	-80586	-50499	-17067	-2926
Equity and investment fund shares/ units	113138	:	7237	:	110841	105156	260518	319810	9570	76337
Insurance, pensions and standardised guarantee schemes	20643	0	160	0	-1218	22539	2004	0	-289	-1239
Financial derivatives and employees stock options	263	0	-2861	0	-23948	0	-11640	0	0	-38186
Other accounts (receivable/payable)	-75	75956	-52334	-1789	60532	-131368	212624	203467	9511	83991
	146725	122533	-102949	-75721	-331848	-384778	593296	464877	-190688	-12376
Net lending (+) / net borrowing (-) (from financial accounts)	24192		-27228		52930		128419		-178312	



Example of Balance sheets in the Danish economy



Example of Balance sheets in the Danish economy

Balance sheet 2015	Household		Government		Financial corp.		Non-financial corp.		RoW	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Fixed capital excluding dwellings	422997		955374		77700		1986689			
dwellings	1864151		0		0		943360			
Monetary gold and special drawing rights (SDRs)					28316	12614				
Currency and deposits	932272		270051	15556	1124697	3007647	283788	0	1047390	634994
Debt securities	90262	7846	152268	916271	4129830	3566752	246595	180466	1637069	1584690
Loans	0	2598180	269973	254749	5306181	1253351	669096	1629838	497297	1006429
Equity and investment fund shares/ units	1831918	0	424975	0	4660164	4610381	2203412	3759244	1585687	2336532
Insurance, pensions and standardised guarantee	2877306	0	1617	0	11077	2928699	32300	0	16724	10325
Financial derivatives and employees stock option	1008	0	252637	0	252637	0	-168124	0	0	0
Other accounts (receivable/payable)	45039	90706	148140	175537	453530	771985	1232406	834616	0	0
Net lending (+) / net borrowing (-) (from financial accounts)										



Structure of the model



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The behavioural equations consistently links the balance sheets to the rest of the economy.



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Theoretical underpinning

- 1 The structure is largely based on the post-Keynesian theory.
- 2 The models are demand driven (both in the short-run and the long-run).
- 3 The creation of credit is endogenous.
- 4 The structure of the model incorporates all accounting identities along with the equations.



What is the SFC framework capable of?



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1. The framework can link the real and financial sectors.



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1. The framework can link the real and financial sectors.
2. The models have the potential to explain debt dynamics.



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- 1 Important to understand which sector is accumulating flows.
- 2 Important to detect debt problems.
- 3 The information is later used in defining the structure of the model.

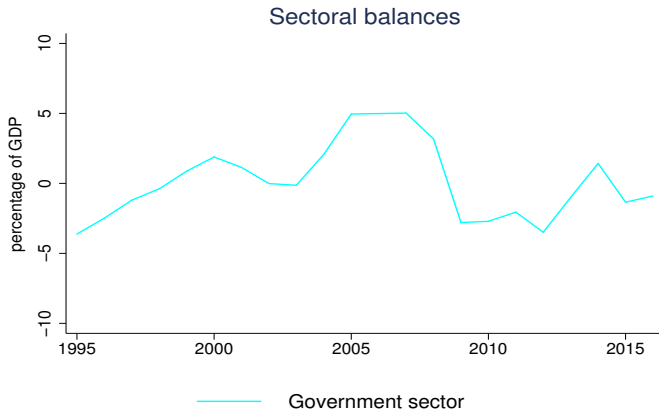


Importance of flow accounting



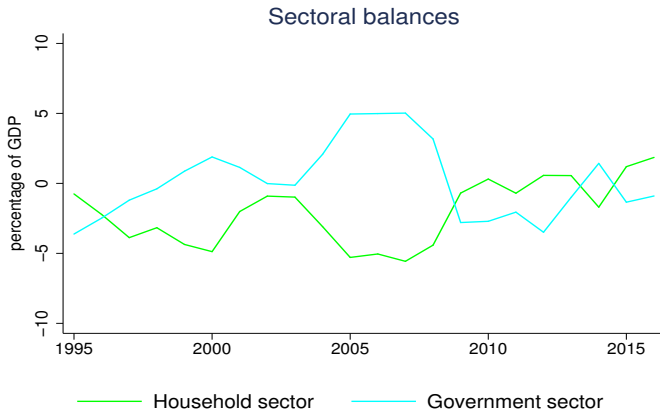
Importance of flow accounting

Sectoral balances of the Danish economy



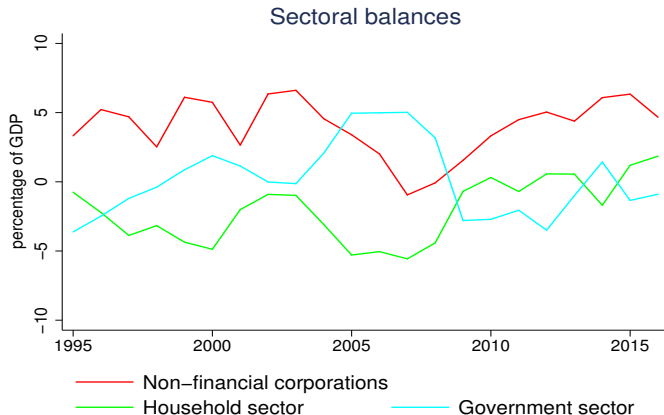
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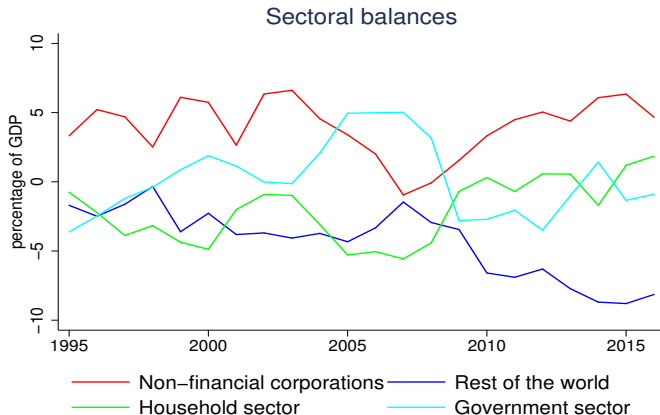
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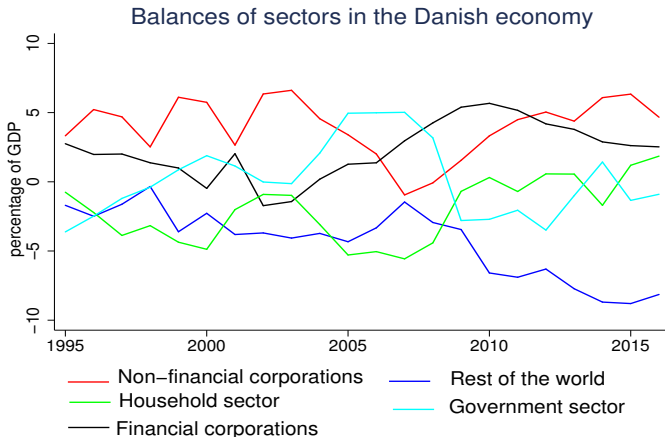
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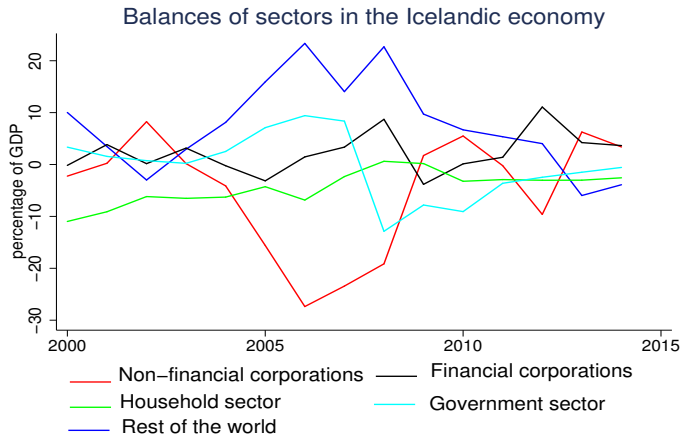
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Importance of flow accounting

Sectoral balances of the Icelandic economy



Importance of Balance sheet accounting



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- 1 Balance sheets clearly reveal the stock of debt.
- 2 Balance sheets contain information about the construction of financial instruments in the economy.
- 3 The information contained in the balance sheets is important to understand the fragility of the system.



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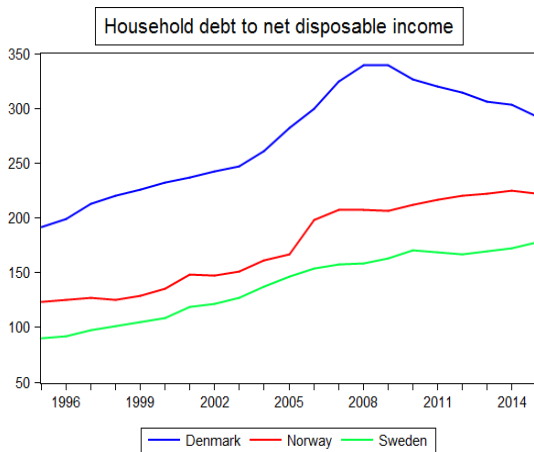
Let us take an example of the Danish household sector!



Importance of Stock-Flow ratios

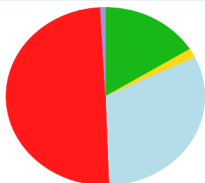
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Let us take an example of the Danish household sector!



Balance sheets interactions in the Danish economy

Assets of households

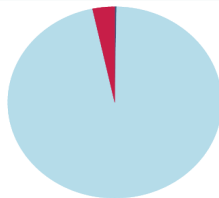


Balance sheets interactions in the Danish economy

Assets of households



Liabilities of households

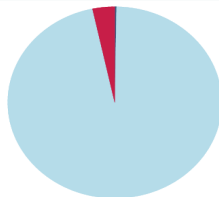


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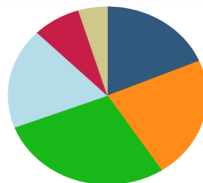
Liabilities of households



Assets of financial corporations

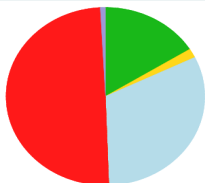


Liabilities of the financial sector

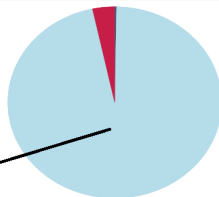


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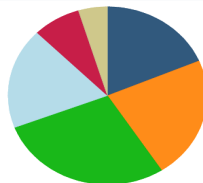
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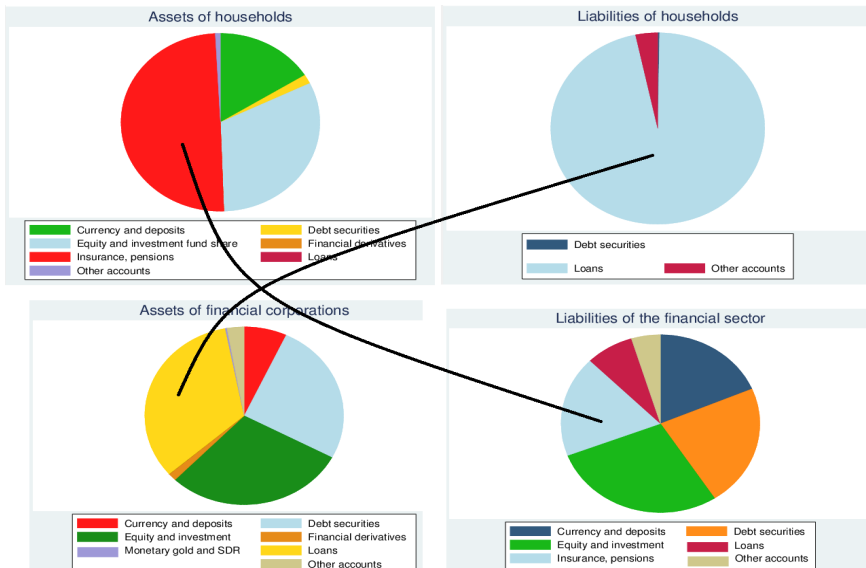
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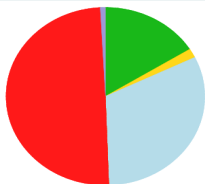


Comparing the Irish and Danish households' balance sheets

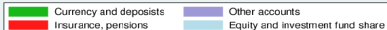
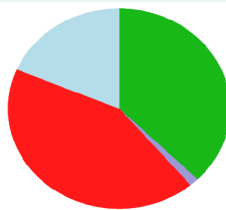


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Assets of households - 2015 (Denmark)

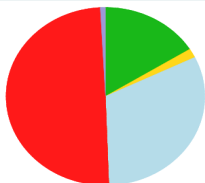


Assets of households - Ireland (2008)

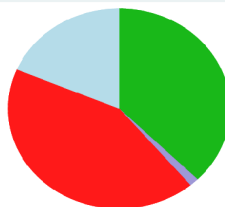


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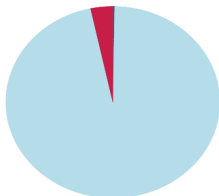
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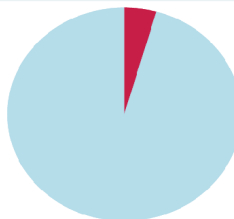
Assets of households - Ireland (2008)



Liabilities of households - Denmark (2015)



Liabilities of households - Ireland (2008)



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- 3 On the liability side, the demand for loans by the households is fulfilled by the banking sector.
- 4 The creation of credit in the system is demand-driven (nothing to do with the loanable funds theory).



Practical challenges



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Practical challenges

- ① The structure of an SFC model can get really complex.
- ② A very disaggregated model can be very complicated and sensitive to minor changes.
- ③ Modelling exchange rate dynamics for sovereign currencies is a problem.
- ④ It is not always possible to track the circulation of money, due to data limitations (e.g., Iceland).



Which Models?



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- 1 There are different varieties of macroeconomic models, e.g. DSGE (RAMSES in Swedish Central Bank), SFC (Bank of England - not official), ADAM (Denmark Statistics), QMM (Icelandic Central Bank) etc.



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- 2 Models differ in their explanations and interpretations of economic behaviours.
- 3 All macroeconomic models have their own strengths and weaknesses.



The way forward



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- 2 Current macroeconomic models should also pay considerable attention to the balance sheet analysis along with the flows.
- 3 The focus should be on understanding the link between financial flows and the real sector.
- 4 Along with aggregated macro models, microfoundations are also important.



Thank you!

