

The Klein Legacy:
Retrospect and Prospect

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Academic genealogy

Lawrence Klein



Tom Cooley



Lee Ohanian



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Quotes

- ▶ It would be impossible for me to discuss Klein's immense output in just 30 minutes.
- ▶ Instead, I will discuss seven threads of Klein's thought that link the past, present, and future of economics.
- ▶ *Lives of the Laureates: Twenty-three Nobel Economists by William Breit and Barry T. Hirsch.*

Talk by Lawrence Klein at Trinity University.

Macroeconometric models

We worked as a team and focused on a single problem—to put together an econometric model of the American economy ...using the best of statistical theory, economic theory, and available data

Macroeconometric models

- ▶ Old idea of economists: Quesnay (Tableau économique), Walras.
- ▶ Pioneers: Tinbergen (1939, Noble Prize 1969), Haavelmo (1943, Noble Prize 1989).
- ▶ Klein-Goldberger model (1955):
 1. Forecasting.
 2. Policy Analysis.
 3. Counterfactuals.

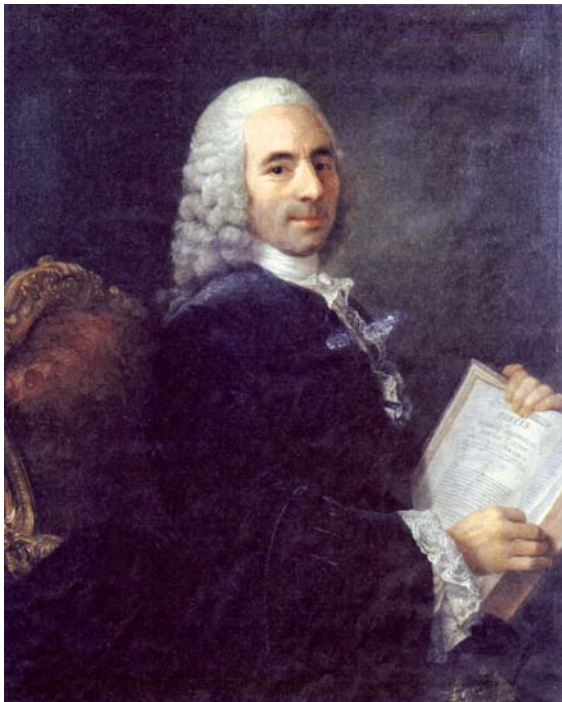


TABLEAU ÉCONOMIQUE.

Fournies par l'agriculture, prairies, pâturés, forêts, mines, pêche, &c. En grains, bœufons, viandes, bois, bestiaux, matières premières des marchandises de main d'œuvre, &c. Debit réciproque d'une classe de dépense à l'autre qui distribue le revenu de 600 liv. de part & d'autre, ce qui donne 300 liv. de chaque côté : outre les avances qui sont conservées. Le Propriétaire subsiste par les 600 liv. qu'il dépense. Les 300 livres distribués à chaque classe de dépense peuvent y nourrir un homme dans l'une & dans l'autre : ainsi 600 livres de revenu peuvent faire subsister trois hommes chefs de famille. Sur ce pied 600 millions de revenu peuvent faire subsister 3 millions de familles estimées à 3 personnes, hors de bas âge, par famille. Les frais de la classe des dépenses productives qui renaissent aussi chaque année, & dont environ la moitié est en salaire pour le travail d'homme, ajoutent 300 millions qui peuvent faire subsister encore un million de chefs de famille à 300 liv. chacun. Ainsi ces 900 millions qui naissent annuellement des biens fonds, pourroient faire subsister 12 millions de personnes hors de bas âge, conformément à cet ordre de circulation & de distribution des revenus annuels. Par circulation on entend ici les achats payés par le revenu, & la distribution qui partage le revenu entre les hommes par le paiement des achats de la première main, abstraction faite du commerce qui multiplie les ventes & les achats, sans multiplier les choses, & qui n'est qu'un accroissement de dépenses théoriques.

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 DU 1817.

DEPENSES PRODUCTIVES.	REVENUS.	DEPENSES SPÉRIELLES.
<p><i>Avances annuelles.</i></p> <p>600 produisent.....</p> <p><i>Productions.</i></p> <p>300 reproduisent net.....</p> <p>150 reproduisent net.....</p> <p>75 reproduisent net.....</p> <p>37-10 reproduisent net.....</p> <p>18-15 reproduisent net.....</p> <p>9-7-6 reproduisent net.....</p> <p>4-13-9 reproduisent net.....</p> <p>2-6-10 reproduisent net.....</p> <p>1-3-5 reproduisent net.....</p> <p>0-11-8 reproduisent net.....</p> <p>0-5-10 reproduisent net.....</p> <p>0-2-11 reproduisent net.....</p> <p>0-1-5 reproduisent net.....</p>	<p><i>Revenus.</i></p> <p>600</p> <p>300</p> <p>150</p> <p>75</p> <p>37-10</p> <p>18-15</p> <p>9-7-6</p> <p>4-13-9</p> <p>2-6-10</p> <p>1-3-5</p> <p>0-11-8</p> <p>0-5-10</p> <p>0-2-11</p> <p>0-1-5</p>	<p><i>Avances annuelles.</i></p> <p>300</p> <p>150</p> <p>75</p> <p>37-10</p> <p>18-15</p> <p>9-7-6</p> <p>4-13-9</p> <p>2-6-10</p> <p>1-3-5</p> <p>0-11-8</p> <p>0-5-10</p> <p>0-2-11</p> <p>0-1-5</p>

En marchandises de main d'œuvre, logemens, vêtements, intérêts d'argent, domestiques, frais de commerce, dépenses étrangères, &c. Les achats réciproques d'une classe de dépense à l'autre distribue le revenu de 600 liv. Les deux classes dépensent en partie sur elles-mêmes, & en partie réciproquement l'une sur l'autre. La circulation porte 600 liv. à cette colonne, sur quoi il faut retirer les 300 liv. des avances annuelles, reste ici 300 liv. pour le salaire. L'impôt qui doit être rapporté à cette classe, est pris sur le revenu qu'on obtient par les dépenses productives, & vient se perdre dans cette classe-ci, à la réserve de ce qui rentre dans la circulation, où il renait dans le même ordre que le revenu, & se distribue de même aux deux classes. Mais il est toujours au préjudice du revenu des propriétaires, ou des avances des cultivateurs, ou de l'épargne sur la consommation. Dans les deux derniers cas il est destructif, parce qu'il diminue d'autant la reproduction ; il en est de même de ce qu'on paie à l'étranger sans retour, & de ce qui en est arrêté par les fortunes pécuniaires des traitans chargés de la perception & des dépenses ; car ces parties de l'impôt détournées ou dérobées par l'épargne aux dépenses productives, ou prises sur les avances des cultivateurs, éteignent la reproduction, retombent doublement en perte sur les propriétaires, & détruisent enfin la masse du revenu qui fournit l'impôt, lequel ne doit porter que sur le propriétaire, & non sur les dépenses productives, où il ruine le Cultivateur, le Propriétaire, & l'Etat.

#

REPRODUIT total.....600 de revenu & les frais annuels d'agriculture de 600 livres que la Terre restitue. Ainsi la reproduction est de 1200 livres.

Evolution I

▶ 1970s and 1980s were the decades of deep changes.

▶ Problems:

1. Fit (Nelson, 1972).
2. Nonstationarity (Granger, 1981).
3. Economic Foundations (Lucas, 1972).
4. Identification (Sims, 1980).

Evolution II

- ▶ 1980s: Real Business Cycle theory: advances and difficulties.
- ▶ Late 1990s, early 2000s: revival.
- ▶ Why?
 1. Advances in economic theory: second generation equilibrium models.
 2. Advances in econometrics: simulation methods.

Why models?

- ▶ I am going to borrow from my experience:

MEDEA: a DSGE model for the Spanish economy.

1. Organize our thinking.
2. Reproducibility.
3. Accumulation of capital within organizations.
4. Ex-ante versus ex-post analysis.
5. Counterfactuals.
6. New circumstances.

Why dynamic equilibrium models?

- ▶ Explicit microeconomic foundation.
- ▶ Robust to Lucas critique.
- ▶ Welfare analysis.
- ▶ Design of optimal policy.
- ▶ Particularly important: integration of a financial sector.

National income and product accounts I

But the real advances that emerged from this joint effort [The Wharton models] were...

(3) the preparation of a databank for the systematic accounting of all the data used in the system;

National income and product accounts II

- ▶ Macroeconometric model-building was founded on the availability of aggregate data.
- ▶ Klein always paid much attention to:
 1. Building of data.
 2. Integration of micro and macro data.
 3. The mapping between theory and data.

National income and product accounts III

► However:

1. National income and product accounts are rarely thought any longer in graduate school.
2. Lack of interest in sufficient funding.
3. Deterioration of our ability to measure aggregate data:
 - 3.1 New products and services.
 - 3.2 Intangible investment.
 - 3.3 Changes in consumption patterns.

Micro data I

At the Survey Research Center I learned a great deal about household behavior and techniques for measuring it. The work was based on samples of human populations consisting of a few thousand cases for each study.

Micro data II

- ▶ Much research over the last two decades on macroeconomic models with individual heterogeneity.
- ▶ UPenn Econ has been an important contributor to this research (Victor Ríos Rull, Dirk Krueger, Jeremy Greenwood, Iourii Manovskii, ...).
- ▶ Interest revived by financial crisis \Rightarrow wealth distribution matters! (this was, actually, an early research interest of Klein's: Pigou effect).
- ▶ However, the full integration of macroeconometric models with individual heterogeneity remains an open challenge.

Computers

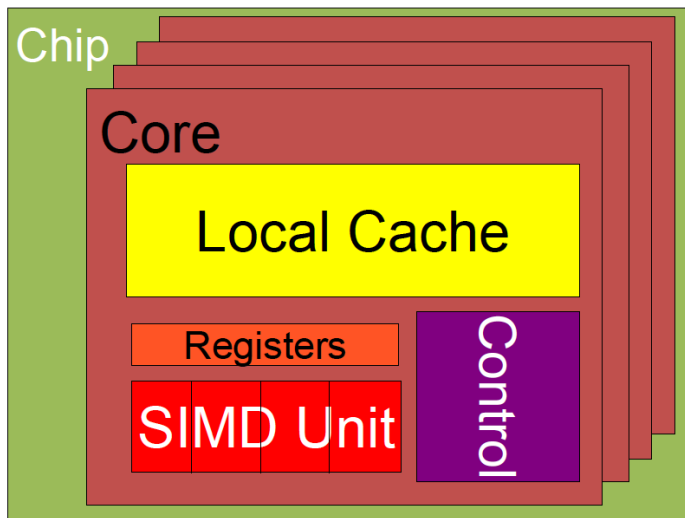
The computer, as one can easily see, has played a large role in my involvement with econometric research and application, but that part of the story is not yet finished. Interesting new developments are on the horizon.

Parallelization

- ▶ Massive parallelization is a game-changer:
 1. Big data.
 2. Machine learning.
 3. GPUs.
- ▶ Tapping the supercomputer under your desk.
- ▶ Joining with Greg Kaplan (Princeton):
Laboratory for Advanced Computational Economics (LACE).

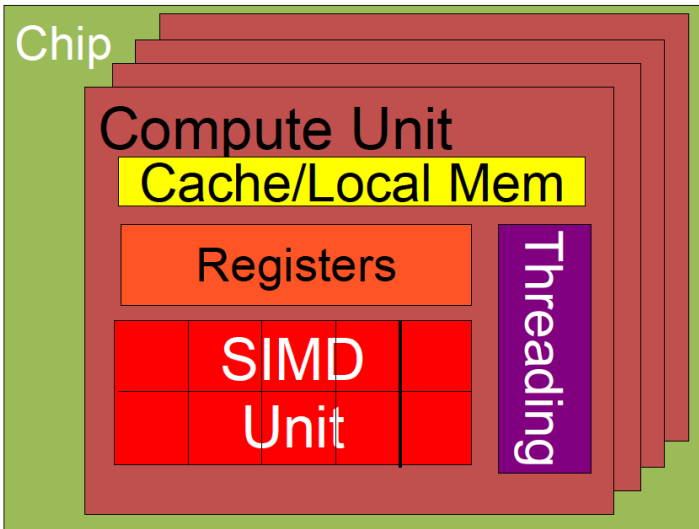
CPU

Latency Oriented Cores



GPU

Throughput Oriented Cores



Input-output I

But the real advances that emerged from this joint effort [The Wharton models] were...

(2) an explicit input-output sector of interindustry flows that was tied consistently with the traditional macro models of final demand and income determination;

Input-output II

- ▶ Most contemporary macro models have one sector (at most two!).
- ▶ Rich set of input-output relations.
- ▶ Older literature: Long and Plosser (1983), Horvath (1998), Dupor (1999).
- ▶ Newer literature: Acemoglu, Carvalho, Ozdaglar, and Tahbaz-Salehi (2012), Gabaix (2011), Foerster, Sartre, and Watson (2011), Oberfield (2013).

Non-linearities I

I spent a great deal of time with student collaborators and IBM researchers working on nonlinear problems associated with maximum likelihood.

Non-linearities II

- ▶ Time-varying volatility (“uncertainty shocks”).
- ▶ Non-standard preferences (Epstein-Zin, ambiguity aversion, ...).
- ▶ Effects of state-dependence of shocks.
- ▶ Occasionally binding constraints:
 1. Zero lower bound of nominal interest rates.
 2. Sudden stops.
- ▶ Volatility paradox.

Academic freedom

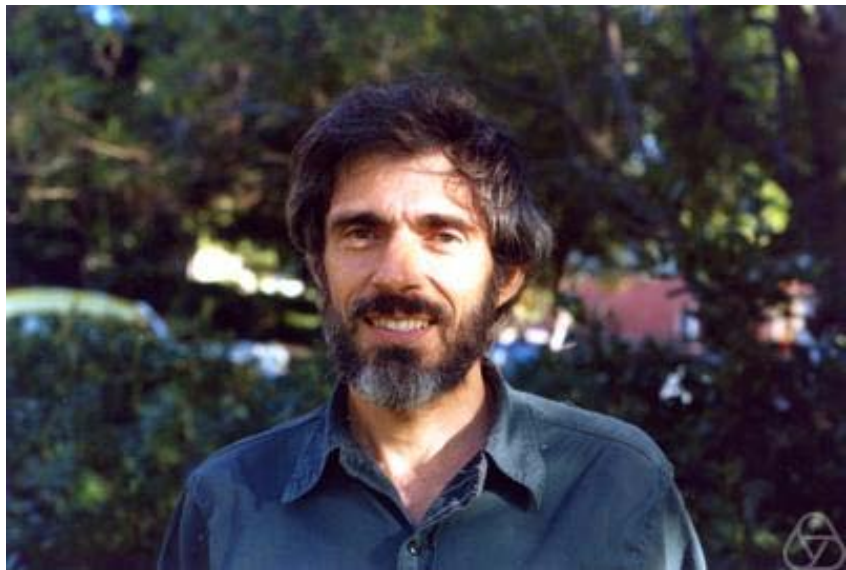
In the McCarthy era I left Michigan for the peace and academic freedom of Oxford...In 1958 I returned to America and took up a professorship at Pennsylvania, where I admired the position of the president, provost, and deans on the serious matter of academic freedom.

University of Michigan and the MCarthy Era

- ▶ In 1954 the University of Michigan suspended and then terminated Chandler Davis (math) and Mark Nickerson (pharmacologist).
- ▶ It also suspended but then reinstated Clement L. Markert (biology).
- ▶ Reason: refusal to give testimony during a visit to Michigan of a group from the U.S. House Committee on Un-American Activities.
- ▶ Chandler Davis actually went to prison for six months, where he published a paper with the acknowledgment:

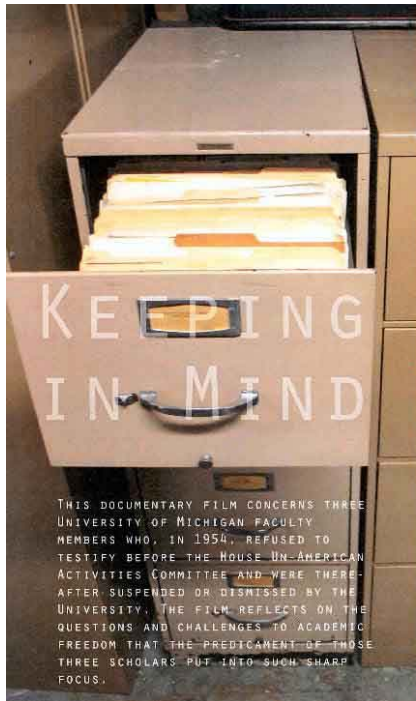
“Research supported in part by the Federal Prison System. Opinions expressed in this paper are the author’s and are not necessarily those of the Bureau of Prisons.”

- ▶ Honored by “Davis, Markert, Nickerson Lecture on Academic and Intellectual Freedom.”

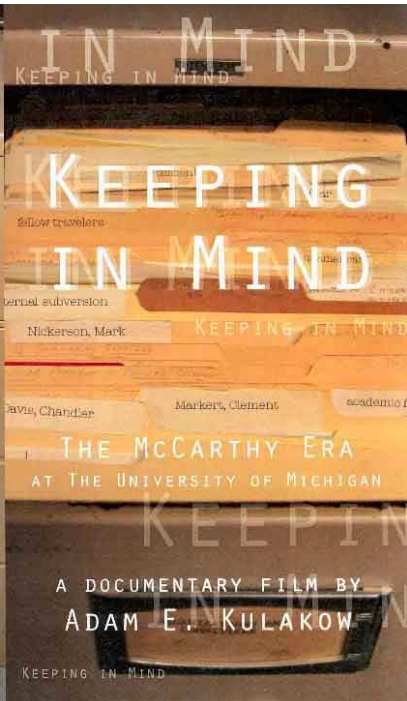








THIS DOCUMENTARY FILM CONCERNS THREE UNIVERSITY OF MICHIGAN FACULTY MEMBERS WHO, IN 1954, REFUSED TO TESTIFY BEFORE THE HOUSE UN-AMERICAN ACTIVITIES COMMITTEE AND WERE THEREAFTER SUSPENDED OR DISMISSED BY THE UNIVERSITY. THE FILM REFLECTS ON THE QUESTIONS AND CHALLENGES TO ACADEMIC FREEDOM THAT THE PREDICAMENT OF THOSE THREE SCHOLARS PUT INTO SUCH SHARP FOCUS.



KEEPING IN MIND

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THE MCCARTHY ERA
AT THE UNIVERSITY OF MICHIGAN

A DOCUMENTARY FILM BY
ADAM E. KULAKOW

KEEPING IN MIND

Gaylord Probasco Harnwell

