



Algorithmic Social Sciences Research Unit

ASSRU

Department of Economics
University of Trento
Via Inama 5
381 22 Trento, Italy

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**FERDINANDO TARGETTI – IN MEMORIAM
SCHOLAR, FRIEND, COLLEAGUE –AND A GENTLEMAN***

K. Vela Velupillai[♥]

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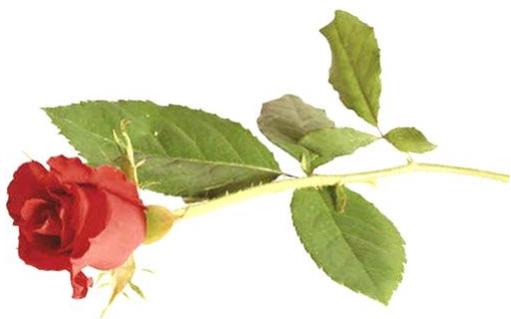
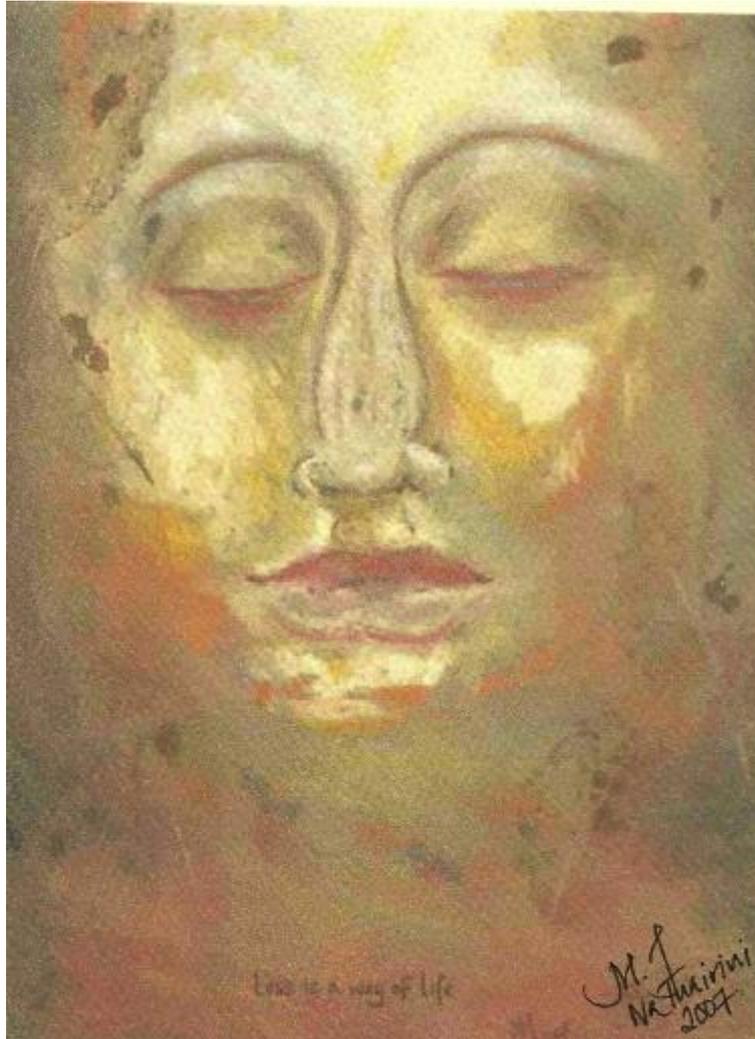
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[♥] Department of Economics & the Algorithmic Social Science Research Unit, University of Trento.

Ferdinando Targetti – In Memoriam

1 July 1945 (Moltrasio) - 10 July 2011 (Milan)

Scholar, Friend, Colleague – and a Gentleman



For 'Bogna'

In praise of (Polish) Papal Faustian Pacts
- In Eternity

-



*Siała **Boginecką** mak,
Nie wiedziała jak,
dziadek, wiedział nie powiedział
A to było tak*

“And so it is with our own past. It is a labour in vain to attempt to recapture it: all the efforts of our intellect must prove futile. The past is hidden somewhere outside the realm, beyond the reach of intellect, in some material object (in the sensation which that material object will give us) of which we have no inkling. And it depends on chance whether or not we come upon this object before we ourselves must die.”

Marcel Proust: **Remembrances of Things Past***



Mantegna "The Martyrdom of St. James" (1453) Eremitani Church, Padua

"A few feet away, a strapping great fellow in livery stood musing, motionless, statuesque, useless, like that purely decorative warrior whom one sees in the most tumultuous of Mantegna's paintings, lost in thought, leaning upon his shield, while other people around him are rushing about slaughtering each other." — Swann's Way

* Penguin, 1983 Edition; Translated by C. K. Scott Moncrieff & Terence Kilmartin, Volume 1, pp. 47-8.

A Brief Prefatory Note

In all of my 64 years of living I have rarely been able to say, of any of the hundreds of friends and acquaintances that have entered, and left, my personal or professional life, that any one of them left *only* happy memories of our encounters. Of *Ferdinando Targetti* I have *only* very happy memories – of a perennially smiling face, of an animated soul, of an engaging and engaged intellectual, of a personal friend of immense loyalty and of a generous and kind human being.

Not very strangely, I have a picture-perfect memory of the first time we met, 38 years ago, between the narrow space of the bookshelves that lined the copiously endowed University Library at Cambridge University. The ever-smiling face, the impeccably dressed Gentleman, the warm and firm hand-shake, and a friendship was born, even as my instincts confirmed that it would last – but not that it would end as abruptly as it did, with the intervention of the termination of a tenancy on time.

This paper is a personal, *very private*, tribute – albeit hopelessly inadequate – by one very ordinary academic economist, to another remarkable one. It is in the nature of our intrinsic measure as professionals that my tribute to Targetti should fall far short of what he deserves.

But this is almost the best I can manage, at this point in time.

I dedicate this paper to lovely ‘*Bogna*’, a widow before her time, a formidable personality who combined an enchanting beauty with deep intellectual interests, pursued with unusual – but, perhaps, not so for a Pole – passion.

Only she will understand, and so it should be, the subtexts to my dedication to her.

In sadness – but with memories to sustain it,

Vela Velupillai

Trento
18 July 2011
Revised: 20 March 2012

SO. A Personal Preamble

*Do not go gentle into that good night,
Old age should burn and rave at close of day;
Rage, rage against the dying of the light.*

Dylan Thomas

The paper is divided into four parts, apart from this brief personal preamble, with my attempts to portray – *In Memoriam* – Ferdinando Targetti, in his incarnation as a Scholar, Friend, Colleague, and all in his characteristically Gentlemanly ways.

On Tamil New Year day, 14 April, 2008, I wrote Ferdinando and Bogna with wishes in Tamil, *without a translation*. He wrote back the next day:

Caro Vela

Mi sa che Dante avrà un bel da fare a far spazio nel suo Inferno a tanti politici italiani. Povero il nostro Paese che vede come innovatori e come difensori dei più deboli un partito di proprietà di un imbonitore e un partito con ideali medioevali!

Vorrei poter leggere il tuo poema Tamil che forse mi rincuorerebbe

Un abbraccio

Ferdi

He was deeply troubled by what he saw as the development of Italian society, its values, its politics, and the economics it was practicing, and for once I saw him display helplessness, even while trying to find ways to salvage something of value, in the depth of despair.

Ferdinando Targetti was an honest intellectual. He never compromised on intellectual integrity and never worked on any issue, or tried to contribute to any discussion, for the sake of ‘fashion’, academic, societal or political. He possessed a strength of conviction that he had arrived at with scholarship, sympathy and genuine compassion for every kind of underprivileged minority – in every walk of life.

He waxed lyrical, a few years ago, after Bogna and he visited India, purely as tourists. They did not ignore the massive and visible poverty; but they were enlightened intellectuals, with a deep understanding of cultural evolution and historical contingencies to know that societies and cultures ebb and flow. His vision of economics was intrinsically dynamic, in what we – he and I – felt was a Cambridge vision of endogenously driven evolution. The seeds of greatness, and the powers to undermine its fruits, were both intrinsic to the endogenous

dynamics of a society. This vision underpinned his warm, generous and acute impressions and appreciation of the sleeping giant he thought India was – and, *ex post*, to be terribly Swedish about it, he has been proven to be amply correct.

When he told me how much Bogna and he had been mesmerised by the frescos of the majestic caves of Ajanta and I told him that he, then, must also visit the Sigiriya Fortress in my own, once salubrious Island, he promised me he would do so, as soon as possible. Alas, as a tenant of time, like all of us, his lease ran out before his time.

Our interests and visions were deeply influenced by the Cambridge Economics fashioned by Keynes's immediate colleagues, followers and students, who happened to be our own common teachers: Kaldor, Goodwin, Kahn, Robinson and Sraffa, at the 'old' Cambridge; but we also shared a common esteem for the economics of the Stockholm School, particularly the works of the immediate followers of Wicksell: Lindahl, Myrdal and Lundberg¹; and, above all, for the extraordinary contributions of Kalecki².

§1. Remembrances of a *Friend*

“My dear *very aged* friend (but aged only as a friend, remember that you are younger than me!!),

It is always a pleasure to receive news and "scribbles" from you, which, together with your letters, are nice little pieces of English literature, which I am used to read to Bogna, pretending to be an English actor!

It is not a pleasure to see unemployed people and to have lost some of my cumulated savings, *but it is a pleasure that we, old keynesians, are vindicated by the events of the world capitalism ”*

Targetti to Velupillai (e-mail, Christmas day, 2008; last set of italics added)

I first met Ferdinando Targetti, *The Ambassador*³, as he was affectionately known among us, the perennially *poor* graduate students at Cambridge in the early 1970⁴s, on the fourth floor

¹ I had an unfair advantage over Ferdinando on this front, being a 'Swede' ('by adoption' as Hicks once wrote to our common good friend, Guglielmo Chiodi about me)

² Contrariwise, he had an 'unfair' advantage over me on the Kalecki front, having access to Polish, not only through Bogna!

³ Targetti was always immaculately and stylishly dressed, with a tie, expensive-looking jacket, perfectly creased trousers and starched shirts – in complete contrast to those like me, shabbily dressed, as if the clothes on us had been bought at the nearest Church sale, and moving about in dilapidated cycles. I had never seen Targetti on a bicycle, during our shared Cambridge years, both in the early and, then, at the end of the 1970s.

⁴ To be precise, during the Michaelmas Term of 1973, when I had just arrived in Cambridge and he was already a veteran. My impression, then, was that he knew anyone worth knowing and, more

of the University Library, where I had ‘colonised’ a small table, piled up with all kinds of books and Journals. He would breeze in, know exactly which shelf he wanted to ‘raid’, pick up the many Journals and books he needed, and disappear again – but not without a polite and friendly greeting, a gentle, but penetrating question on what I was reading, how my research was progressing. From time to time we would go down to the basement canteen and talk about ‘dis & ‘dat, gossip, mostly, but also some serious interchanges about Cambridge Economics as we understood it, then.

We, neither he, nor I, had any idea that we were living in the afterglow of the *Cambridge Controversies in Capital Theory*⁵; we thought we were living in its *High Noon*, at its *zenith*. Of course we never even imagined that we were actually living through the last days of the demise of *Cambridge Economics in the Keynesian vein*, and were then young enough to live long enough to experience its *nadir*, too.

The bare bones of Targetti’s distinguished professional career are easy enough to state in a concise form⁶. He was born on 1 July, 1945, in Moltrasio, in the province of Como and died on Sunday, 10 July, 2011, in Milan. He graduated from Milan’s Bocconi University, from the faculty of economics and commerce, in 1970, and studied at the LSE and Cambridge (Pembroke College) in the early 1970. Apart from various short-term and visiting assignments at Universities in Europe and the US (Bocconi, Brescia, Castellana, Paris XIII and NYU), he spent almost his entire Professorial life at the University of Trento, from 1974, till early retirement due to ill health, in 2010.

He was on leave from his Professorial duties, during the period 1996-2001, when he was a Member of Parliament, representing the left wing ‘Olive Coalition’, from an electoral district of Milan.

importantly, knew everything worth knowing. I had very little reason to change my mind on either of these ‘first impressions’ during the next almost four decades of our friendship.

⁵ The title of Geoff Harcourt’s classic text (Harcourt, 1972), paraphrasing Harry Johnson’s earlier work on *Some Cambridge Controversies in Monetary Theory* (Johnson, 1951-52). In a very recent e-mail to me (5 February, 2011), Targetti wrote:

“In 1973, I invited Geoff Harcourt (he was my supervisor) for a tour to give conferences in the Italian universities; Pavia University invited him at the Grand Hotel. Geoff started the speech with one of his jokes, praising the generosity of Italians, because in the back of the big bed of his room, he saw the initials of his name in forged iron !

⁶ Others abler and more familiar with his professional and personal life would, no doubt, write more finessed ‘obituaries’, where the full details of his career will appear, in the goodness of time.

During the last decade of his Professorial tenure at Trento, he was also associated with the University's graduate *School of International Studies*, and its Director for the first five years of that period. In Spring 2011 I agreed to give the graduate course Targetti had been responsible for, at this School, only as a *moral duty* of a friend, to a prematurely departed friend, at that time 'only' in 'early retirement', and have continued for a second year, entirely because I feel – and hope – I can continue a part of the tradition he would have wanted the students to learn. Whether I have been faithful to at least a part of the tradition he believed in, and practised, is another matter.

My chosen textbook for the course was **Growth and Policy in Developing Countries** by Ocampo, Rada and Taylor⁷ (Ocampo, et.al., 2009), an outstanding, uncompromising and unabashed Kaldor-Goodwin approach to policy-oriented macroeconomics, in direct contrast with every kind of orthodox macroeconomic development theory. Kaldor and Goodwin were more than simply our - Targetti's and my - intellectual godfathers: they became, over the years, our mentors, friends and sometime colleagues, in England and in Italy.

He co-edited, with Anthony Thirlwall, the posthumously published *Raffaele Mattioli Lectures* of 1984, by Kaldor (1996)⁸.

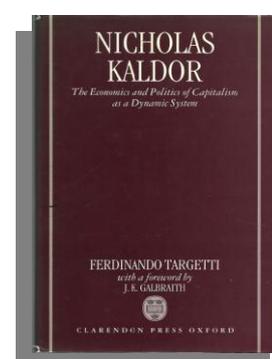
⁷ Lance Taylor is, in my opinion, the true successor to the 'third incarnation' of Kaldor – see §3, below – in combination with the Goodwin of the celebrated Growth Cycle (Goodwin, 1967), an aspect of Kaldor's 'second incarnation' (functional income distribution), and an enlightened synthesis of Minsky's Keynes and Godley's Kaldor. Godley was himself inspired to develop his New Cambridge Stock-Flow accounting schemes on the basis of Kaldor's work that led to his 'third' incarnation, but Lance Taylor's adoption of Godley's Kaldor (see, for example, Shaikh, 2007, p.7 & fn. 2, p.17 and *ibid*, chapter 5) was only, in fact, an adaptation of his own fundamental modelling vision, that was first outlined more than thirty years ago (see, for example, Taylor, 1979 – which was, in fact, not only the textbook I used when lecturing on development economics in the early 1980s and, again, in the second half of the 1990s, but also a 'manual' I carried with me during my own, short-lived, career as a policy advisor at one or another UN organ). Incidentally, the so-called New Cambridge models came into being in the early 1970s, during my graduate student days at Cambridge. We, as students, only dimly perceived the conflicts between 'Old Cambridge', represented most explicitly by Kahn and Posner, and the 'New Cambridge' of Godley & the Department of Applied Economics which he was directing, together with Robert Nield. However, there was no doubt, even in the minds of raw graduate students, that the intellectual spirit underpinning New Cambridge was Kaldor.

⁸ Alas, Targetti's important, mildly provocative and wise, five questions, in the Discussion section, were left unanswered by the distinguished *Lord of Newnham* (see, pp. 138-141 & the footnote on p.141).

He has been a prolific contributor, in the classic pamphleteering tradition of the Neapolitan Count, Carafa⁹, to current issues in the political economy scene, in all of the leading Italian ‘broadsheets’, in the whole political spectrum, ranging from the right to the left: *l’Unità*, *Il Sole 24 Ore*, *Il Corriere della Sera*, *la Repubblica*, *Il Giorno*, *L’Alto Adige* and *il Manifesto*.

Among his many distinctions was the award, in 1989, of the *Saint Vincent* prize for the best book in economics of the year, for the Italian original of his much acclaimed biography of Kaldor, *Nicholas Kaldor: Economia e Politica di Un Capitalismo in Mutamento**. More recently, **La Sfide della Globalizzazione: Storia, Politiche e Istituzione**, jointly authored with his younger Trento colleague, Dr Andrea Fracasso, was awarded the *Capalbio* prize for the best text in economics for 2008.

*I am not sure I would have translated ‘*Un Capitalismo in Mutamento*’ as ‘*Capitalism as a Dynamic System*’.



He married the distinguished Polish economist, Dr Boguslawa Kinda, in 1982. They had no children.

One of my lasting pleasant memories of times shared with this gentle, gentlemanly, scholar, and his charming, erudite, wife, ‘Bogna’, occurred in the late 1980s. At that time, I was a Professor in Denmark, but my wife and I spent as many months of any given year at our home on the majestic Lake of Como, on its ‘Manzoni side’. One side of Targetti’s ancestral heritage was on the ‘other’ side of that enchanting lake. Our mutual friend, Roman Frydman and his charming wife, Halina, spent – occasionally – some of their time in Denmark, where many of their relatives had sought refuge from the late-1960s anti-semitic Gomulka regime in Poland. Consequently, I was able to persuade them, during a period the Frydmans spent with

⁹ See Schumpeter (1954), p. 162.

the Targettis, to visit us at our home in Valsassina. That day, when the six of us, were blessed with a classically exquisite Lombard sky¹⁰, was one of the happiest days for my wife and me.

Over the almost forty years that we knew each other, we sent each other our occasional scribbles – his more nuanced and policy oriented, but anchored, always, in solid, classical economic theory; mine more abstruse and getting ‘abstruser’, as Alice may have said – and commented frankly on them. I always valued his comments on my various papers, expressed with gentle frankness, chiding me for being abstruse, but doing so constructively, and suggesting ways of making them appealing to a wider audience. They were always valuable, always erudite and always pertinent – and always expressed from any one of many current streams in which the *Zeitgeist* seemed to have been flowing.

§2. Wisdom of a *Scholar*

“..... When I was young I made my first steps into that direction [of fitting events, i.e., factual propositions, analytical propositions or simple sentences or even ‘boutades’ in a high theory context], but for the fragility of my mind and because of the overwhelming interests for the novelty of facts I did not go much ahead along that way, even if I did not elaborate anything of some importance about the new facts which stimulate my intellectual curiosity. But at least I generally know (it is not much, but it is something) what are the main questions on the carpet.”

Targetti to Velupillai [e-mail, 26 October, 2008]

Over many years of interacting with Targetti I have been blessed with his wisdom on policy issues, at almost every crucial, current, historical point of crisis. He would write me, in his invariably gentle way, pointing out the critical junctures that were important in any actual path neglecting possible alternatives, in a historical context – and why the alternatives were ignored.

In one recent wonderful epistle (e-mail, 26 October, 2008), he summarised the current conundrums with immaculate clarity.

As far as the recent financial crisis is concerned I would enumerate this "decalogo" - from the most limited question to the most all-embracing.

¹⁰ “*Quel cielo di Lombardia, così bello quand'è bello, così splendido, così in pace*” – Manzoni’s famous lines in his ‘**Betrothed**’.

1. In the future the **investment banks** will disappear: which are the risks (conflict of interests or "gemelli siamesi" [Siamese twins] following Mattioli) of having universal banks?
2. In the future a **super-national Bank Regulator** will be necessary facing a financial market which is global. That will be settled or the countries will pass a set of administrative rules which will limit the globalization of financial markets?
3. In the future world we will likely see emerging a **monetary and financial model** different from the one prevailing in the last 10-15 years: less finance, less financial leverage, greater regulation, less liquidity and higher interest rates. Will America be able to cope with it?
4. The contagion passed from investment banks to all banks, from banks to stock exchange, from USA to the rest of the world, it will be from finance to real economics. It will affect investment and consumption, then employment and consumption and hence income and imports. It will then affect even the emerging countries less dependent from finance, but more dependent from export. It will be a **recession or a stagnation** with millions of unemployed people?
5. The financial crisis hits small economies (Island) or economies with banks having liabilities larger than the GNP of the country in which these banks are located. It is conceivable a spread **bankruptcy of the States**?
6. The differences with 1929 is mainly due to the fact that at that time the Governments and the Central Bank did not react with an **anti-cyclical policy**, but with a procyclical one (because of wrong theories and ideologies). Now it is not the case. It is enough?
7. To strengthen the Keynesian measures it is necessary a coordination among the big economies in terms of financial measures and in terms of a **coordinated fiscal policy**. Will be this the (proper) answer or the countries or they will prefer to follow one's own route and give the way to a new Smooth- Hawley Tariff Act à la 1930?
8. The coordination is a possible answer in the short run. But in the medium-long the countries will be willing and able to create a new economic order? Take the example of the macro imbalance between USA in a constant internal (private and public) and external deficit and China (Asia) with constant internal and external surplus and under-valued currency (*vis à vis* the dollar). Which institution or set of institutions will be entitled to tackle these problems: G7, G14, a new IMF? Furthermore the developed world is ready to abandon the ideological myth of the all-power market, and to give a bigger role to the **regulatory tasks of the State**?
9. **USA-EU**. At the onset of the crisis one could suppose that the USA will emerge weaker from this crisis *vis a vis* the Europe, but perhaps it will not be the case. In fact they have one Parliament, one Treasury and one Central Bank, Europe have several institutions, a Treaty which in these circumstances is a burden, an inflexible Central Bank. Furthermore in the short

run Spain is affected by Argentina crisis, UK is in recession, UK, Spain and Ireland have housing market problems, Eastern Europe (Hungary, Baltic countries, Ukraine) is in a mess which draw into it the Western Countries and Banks which have invested a lot there, Italy have less financial problems than the others, but bigger problems in terms of economic structure.

10. The Western world will emerge weaker from this crisis from economic, intellectual and moral ground (even if Obama will win as everybody of us hope for). The USA (despite point 9) less and less will remain as the unique super-power. It is conceivable that the institutional reforms, necessary for a new economic order, could emerge from a **world without a single hegemonic power**: something which never happened before?

Many years ago, Richard Goodwin wrote down the *Ten Golden Rules*¹¹ of Capitalism's dynamics. He later titled this as 'Capitalism's Golden Rules' (Goodwin, 1972 [1982]). Goodwin first presented them the year Targetti arrived in Cambridge, 1972. For the benefit of younger friends of Targetti, I give it in its entirety, here (Goodwin, op.cit, chapter 13, pp. 171-2):

“Capitalism’s Golden Rules

[*Bulletin of the Conference of Socialist Economists*, 1971]

A set of simple, interrelated propositions, based on premises widely accepted by bourgeois economists).

- (1). To each profit rate corresponds a set of relative prices. A change in relative prices alters the technique of production chosen by competitive producers.
- (2). To any particular growth rate there corresponds an efficient technique, i.e., that collection of production processes which, after allowing for necessary accumulation, yields a greater consumption than any other technique.
- (3). The best technique will be chosen by competitive producers if the profit rate on invested capital equals the growth rate.
- (4). Any consumption by owners of produced capital goods means that the profit rate is greater than the growth rate. The result is the choice of an inefficient technique, in the sense that both capitalists and workers could consume more had the technique associated with equal growth and profit rates been chosen.
- (5). All capitalist economies are inefficient in this sense, since capitalists do in fact consume a part of profits.

¹¹ Or, were they the *Ten Commandments*?

(6). Any profit rate greater than growth rate amounts to levying taxes on output for the benefit of a particular class. Like all such taxes they fall unequally on different goods, so that there is an alteration of relative prices which corresponds to no operative aspect of the production process. The result is an inefficient technique and a sub-optimal allocation of resources. This is separate from and additional to the unjustifiable distribution of consumption.

(7). Therefore, Optimality requires in effect expropriation of capitalists, since if the owners of capital can never, now or in the future, consume any of the income the ownership of capital is nominal, its ‘fruits’ accruing to the whole of society.

(8). Just as to each profit and growth rate there corresponds a best technique, so also there is a best technique for the stationary state with zero growth rate. Only a zero profit rate will lead producers to choose that technique.

(9). Therefore, if capitalists cease, either voluntarily or under compulsion, their accumulation, optimality requires the reduction of their revenue to zero in the absence of growth.

(10). Capitalists have been, and still are, engines of growth, however imperfect or wasteful their performance may have been. Consequently, as the industrialised economies gradually but inevitably decelerate, the capitalist loses his function. The determination of the rate of return on capital then becomes a naked struggle over shares in the product. But also the outcome will affect adversely the size of the product to be shared in exactly the same way as monopolistic pricing or excise taxes.”

Coupling Goodwin’s ten golden rules with Targetti’s wise ‘decologo’, would easily enable me to design an interesting course on Capitalism’s macroeconomic conundrums. I doubt many could do much better – and certainly not any current macroeconomic orthodoxy, of any hue.

§3. Reflections on a *Gentleman’s* Biography of an Itinerant Lord¹²

“I have been asked ... to give a talk about Kaldor. Once upon a time [it] would [have been] very simple, but now I am rusty - it is more than 10 years that I do not water that garden! You are a master not only in math-economics, but also in reconstructing the ideas and atmosphere

¹² I refer to Nicholas Kaldor and use the word ‘itinerant’ not in its sense of a ‘nomad’, but in the sense of an intellectual wanderer. Kaldor, to be stylistic about it, in Kaldorian vein, became internationally renowned as a follower, expositor – even a translator – of Austrian capital theory, and at the end of his life was one of the foremost exponents of one variant of Keynesian economics. There were many allegiances and adherences in between, and some of them spawned whole variants of Keynesian economics and economic dynamics, from macroeconomic distribution theory and nonlinear endogenous business cycle theory to refreshing approaches to growth and trade theories. Indeed, Targetti perceptively noted that ‘Kaldor wrote about everything’ (Targetti, 1992, p. viii). Yet, that Targetti was able to tell a coherent story about this ceaseless, restless, ‘itinerant’ academic, is a tribute to his powers of synthesis, which – in my opinion – was entirely due to his mastery of the history of economic thought and analysis.

of the time when the ideas developed. If you will continue with your Trappist behaviour, your silence will be difficult to interpret: agreement or vow of silence?"

Targetti to Velupillai [e-mail, 20 March, 2009]

I was privileged to have been weaned, for my education as an economist, on the magisterial Wicksell biography, **Knut Wicksell: Rebel I Det Nya Riket**, by Torsten Gårdlund¹³. From that original inspiration, I sought to understand the contribution of the pioneers of economic theory by first trying to understand their own intellectual formation¹⁴.

It was, therefore, natural for me to have been interested in, and absorbed by, Targetti's scholarly and comprehensive study of Kaldor's many faceted contributions to economics¹⁵. There were (at least) three Kaldorian incarnations in one full lifetime: the early Kaldor with strong allegiance, in particular, to *Austrian Capital Theory*, handsomely and unequivocally disowned in his famous Corfu Conference debates with Samuelson, Solow and Domar (Kaldor, 1961, especially p. 294)¹⁶; then there was the *Keynesian* Kaldor of the 1950s and early 1960s, developing, at the same time as Kahn, Joan Robinson and Goodwin, growth and

¹³ I was fluent enough in Swedish, by 1971, to have had the serendipitous opportunity to have read it in the original language – even while being a student in Torsten Gårdlund's last lecture classes at the University of Lund, in autumn, 1971.

¹⁴ Most recently, during the **Cambridge Journal of Economics** sponsored Conference in Honour of Geoff Harcourt, at Cambridge in the end of June, I met Peter Groenewegen, who I complimented on his own magnificently comprehensive biography of **Marshall: A Soaring Eagle** (Groenewegen, 1995), and added that 'it was in the great tradition broached by Gårdlund'. His response was: '*Gårdlund's was in a class by itself!*'

¹⁵ Kaldor was my first doctoral supervisor at Cambridge, for the Michaelmas and Lent Terms of 1973/74. Given the 'Swedish Connection' in Kaldor's early intellectual and professional life documented by Targetti (1992, p. 5 & p.11), it may be amusing to narrate the following story of my first encounter with Kaldor, in May, 1973. I was to be interviewed by Kaldor (who was the Chairman of the Faculty that year), before consideration for admission to the doctoral program at Cambridge. I presented myself in Kaldor's small office in the Faculty, quite nervous, and was asked, immediately, by Kaldor: '*Why do you want to come here when you have Lindahl and Myrdal in Sweden?*' It was, of course, out of the question for me to reply by saying: '*Lindahl had died in early 1960!*' Incidentally, Myrdal, who had been the Trade Minister in the Social democratic government till 1947, had to resign under controversial circumstance, before taking up his Directorship at the Economic Commission for Europe, to which he hired Kaldor to be the Head of its Planning and Research Division (Targetti, op.cit, p.11).

¹⁶ Björn Thalberg, my gentle and generous first serious teacher of macroeconomics, who was present at the Corfu Conference, told me, in personal conversations, that Kaldor sat opposite the formidable trio of Samuelson, Solow and Domar and, with characteristic confidence, asserted: 'I have Marx and von Neumann on my side!'

distributive cycle models in the Cambridge Keynesian tradition¹⁷. Finally, there was the ‘third incarnation’ of Kaldor, developing his own vision of intersectoral and multisectoral macroeconomic dynamics, inspired by Adam Smith and Allyn Young, on the one hand, and trying to remain faithful to the effective demand traditions of the Keynesian he always remained.

Kaldor, to a very large extent, and to a much lesser degree, Goodwin, were the intellectual lines of intersection between the contents of this fine book by Targetti and one, early, aspect of my work. In particular, the admirable, albeit not completely successful, attempt to provide a comprehensive background to (mathematical) endogenous trade cycle theory, from its origins in the early 1930s, to a transitory culmination on the eve of the Lucasian revolution and its *ad hoc stochastic shock theory of the cycle*, to place in a proper context Kaldor’s classic Keynesian nonlinear model of the trade cycle (Kaldor, 1940), in Chapter 3 of the Kaldor Biography, attracted my serious attention.

Two other aspect of Targetti’s fine summary of Kaldor’s contributions was of considerable and lasting interest for my own work, over the years: growth theory and Kaldor’s later methodological invectives against what Clower has felicitously referred to as the *Neo-Walrasian Code* (see, Velupillai, 2011).

With hindsight at our disposal, it may not be too unfair to note that both Kaldor’s nonlinear, Keynesian, model of the trade cycle and his various lofty invectives against the *Neo Walrasian code*, may not survive the merciless tests of time. This is, I think the orthodox view that I am stating, not my own, personal, view of the desirability of their persistence and eventual success, in some form, in a possible future.

Be that as it may, chapter 3 in Targetti’s book is truly comprehensive in its attempt at portraying the background and setting in which to place Kaldor’s classic Keynesian, nonlinear, model of the trade cycle. If I had to assign one ‘survey’ type article to a graduate class on Mathematical Theories of the Trade Cycle: From Tinbergen (1931) and Frisch

¹⁷ In my opinion, the classic Kaldorian endogenous, nonlinear, trade cycle model was the one time Kaldor tried to fuse Keynesian elements with Kaleckian insights, and it was not a subject to which he returned in any systematic way in his mature Keynesian years of the 1950s.

(1933) to Lucas (1987) and Kydland & Prescott (1982), one that would provide the base from which to teach the nonlinear, endogenous, theory of the trade cycle, I would still choose this wonderful chapter by Targetti.

But I would need to add many and various caveats to its inclusion and to the way it should be read and used by graduate students. The chapter is marred by serious mathematical, bibliographical, conceptual and doctrine historical infelicities. But these are easy to rectify; the important point is that it provides a beautiful – even if flawed – touchstone for the serious teacher, to interested and mathematically competent students, of the place that was nobly occupied by nonlinear, endogenous, theories of aggregate fluctuations.

Growth at Different Rates and Kaldor's Laws, chapter 7 in the book, serendipitously, has provided my graduate course on *Macroeconomic Development Economics*, at the **School of International Economics** the perfect framework to give the students an alternative vision (see Chapter 15 in Targetti, op.cit) of the possible world of policy in a developing context. I am particularly proud and happy that I agreed to give this course, since I was sure that the way I structured the contents and scope of the course were meant to harmonise with the spirit of Kaldor and the wisdom and vision of Targetti – alas, now also the phantom of the latter, too.

Finally, there remains, at least for me, the puzzle of Kaldor's negligence of Schumpeter, indeed even hostility to his fellow 'Austro-Hungarian'. There are only a handful of innocuous references to Schumpeter in Targetti's magisterial biography. One of them (fn. 50, p. 131) gives the impression that Kaldor may have endorsed a role for the Schumpeterian innovating entrepreneur. But that quote continues in a less than felicitous way (Kaldor, 1954, p.53; see below).

I have always wondered whether the less than intimate relationship between the gentle, laidback, Goodwin and the restless, even effervescent, Kaldor may have its source – or one of its sources – in this 'Schumpeterian dissonance'. Just as Kaldor, in his third incarnation, as his own master, fused Adam Smith and Allyn Young with Keynes, there was Goodwin nobly trying the almost impossible with Marx, Schumpeter and Keynes. In the end, the common element remained Keynes, perhaps in two different Harroddian inspirations, diametrically

opposed to each other: for Kaldor it was Harrod's foreign-trade multiplier (Harrod, 1933), but not his fundamental resource constraint of labour leading to an intrinsic, always active, nonlinearity; for Goodwin, it was the multisectoral Keynes-Leontief multiplier, together with the intrinsic Harrodian nonlinearity¹⁸.

Ferdinando Targetti was too well-mannered a biographer to emphasise these dissonances between the giants who were also his friends and mentors.

§4. The Noble *Colleague*

“Thank you very much for the pictures [of Dick Goodwin with the Cambridge Phillips Machine] and the letter of Dick. Reading those letters I see his smile and I felt his presence close to me. They remind me [of] his lectures in the '70s and the feeling I got: I liked a lot his diagrammatic representation of Sraffa-Leontief and all that (I tried to use the same diagrams to represent the Theorem of Non substitution without reaching anything acceptable); I also liked his Kolmogorov-Volterra¹⁹ graphic representation of Marx's cycle that I taught to

¹⁸ It is my thesis that it was only in the work of the mature Lance Taylor that all these elements came together, but even he may not have incorporated those Schumpeterian elements that came to dominate Goodwin's work in his last years.

¹⁹ This was a characteristically wise and illuminating seemingly erroneous – at least in the eyes of the hair-splitters – reference to Goodwin's use of the classic Lotka-Volterra system of equations to model the 'contradiction of capitalism's aggregate dynamics'. But it is a tribute to Targetti's memory that he remembers it as the 'Kolmogorov-Volterra graphic representation'. There is a very personal story to the way Goodwin became aware of Kolmogorov (1936). From the very first months of my arrival as a graduate student at Cambridge, and even though I was formally Kaldor's pupil, I began seeing and working with Goodwin. One of the first suggestions he made to me was: 'Read and master Minorsky (1962) and Andronov-Chaikin (1949)' – and he lent me both books (the later, expanded, edition of Andronov, Chaikin and Vitt (1966) was a thing of the future, for me, never for Goodwin). In a footnote on p. 69 of Minorsky's book there is a reference to Kolmogorov's 1936 classic – but it was in an Italian journal and in Italian. During the winter break of 1973, I wrote my friend, Guglielmo Chiodi, requesting him to get me a copy of the paper (those were, of course, years before JSTOR, Science Direct and so on). Chiodi not only obtained a copy of the paper – he also translated it into English and sent it to me. During the Easter term one of our fellow graduate students, on the verge of completing his doctoral dissertation, gave a seminar, outlining the main results in the thesis. I was astonished to listen to the presentation – because it was a simple application of the framework in Kolmogorov! I wrote a note to Goodwin, with a copy of Kolmogorov's original, together with Chiodi's translation and pointed out that the core model in the thesis of our fellow graduate student was nothing more than one aspect of Kolmogorov's result. The further ramification of this particular aspect is another story – but from that time onwards, i.e., Spring 1974, Goodwin always used what Targetti correctly remembers as the 'Kolmogorov-Volterra graphic technique'. There were three – obviously hand-drawn – diagrams of dynamics in the phase-plane, in a paper of really only a little more than effectively four pages of text in that classic by Kolmogorov, made easily accessible for a new generation of young aficionados of dynamical systems theory by its 'popularisation' in chapter 12 of the first edition of Hirsch-Smale (1974), which was also introduced to me by Goodwin. But this time I was able to run a race with the champion, as we both read it almost simultaneously; there was no question as to who mastered it first, and quite comprehensively!

classes often not fascinated as we were, [when] listening to [Dick]. Later in the '90s [Dick] came back to his '50's studies and when I tried to read his articles about "special attractors" or about the application to economic cycles of the theory of chaos - well a certain chaos is exactly what happened in my mind. However I was fascinated by the message, strong and convincing, of the representation of the market (capitalist?) system as a completely deterministic system but having endogenous irregularity and unpredictability of the outcome. What a differences in comparison with the representation of the market as an optimum intertemporal allocation system! The actual crisis seems a vindication of that approach."

Targetti to Velupillai [e-mail, 3 February, 2009]

Our lives – his and mine – were plagued by debilitating illnesses during the past decade and a half – indeed literally from my arrival at Trento, in the last years of the last century. Thus, for almost the first eight or nine years of my official tenure here, at Trento, I was almost only present as a ghost, with very little stamina or drive to work intensively. Equally, Ferdinando was increasingly plagued by the illness that cruelly and mercilessly, first debilitated him and then took him away from us, prematurely.

The many ways we could have collaborated on expanding Kaldorian visions never materialised. In particular, my own conviction, honed by years of instruction at Goodwin's enlightened feet, that Kaldor (1940) was, actually, a proverbial 'flash-in-the-pan', although it did inspire a great deal of later work on nonlinear, endogenous, macrodynamics, particularly at the hands of the remarkable Japanese trio of Yasui²⁰, Ichimura and Morishima (see, Velupillai, 2008). I did not think Kaldor ever managed to synthesise growth and cycles, in the way Goodwin did, but that may have been the influence of Schumpeter, as well as Keynes, on the latter.

Targetti was a master expositor of Kaldor's various transmogrifications as he moved from one model of growth theory to another, finally ending up with the kind of applied growth theory, underpinned by Allyn Young's visions and tempered by 'Verdoorn's Law'²¹. Very

²⁰ During a characteristically enchanting lunch in the Tuscan countryside, in 1983, Kaldor, in conversing with me, his former pupil, still remembered, vividly and fondly, Yasui's work, to which he had referred in footnote 3, p. 9 of the Introduction to Kaldor (1960). Incidentally, during that conversation he 'castigated' me for leaving Cambridge (while Joan Robinson had told my good friend, Professor Roger Sandilands, in Strathclyde, where her daughter was living, that she was expecting me to return to Cambridge, shortly!). Almost a quarter of a century elapsed before my return to Cambridge, but it was almost still-born.

²¹ Verdoorn became a part of the powerful team Kaldor assembled to work with him at ECE in Geneva, in the late 1940s; the others being Tibor Barna and Robert Nield (see, Targetti, op.cit, p.11).

few, apart from Ferdinando Targetti, Tony Thirlwall and Lance Taylor managed to provide coherent stories for those of us who wanted to base our *development* visions, from a policy perspective, on Kaldorian multisector models, where supply and demand played crucial roles in that sense made famous by Allyn Young and Gunnar Myrdal: cumulative and circular causation – and, thereby taking us back, too to those famous sections in the first three chapters of *Book I* of **The Wealth of Nations**.

Kaldorian macrodynamic models did manage to be underpinned by Smith and Ricardo, but Marxian dynamics did not enter that world, in the way it did in Goodwin's more powerful nonlinear endogenous macrodynamic models, always trying to find a meaningful synthesis of the cycle and the trend, of growth and cycles, not, thereby, neglecting functional distribution.

It was in this synthesis between Kaldorian visions of growth and development and Goodwin's nonlinear dynamics of growth cycles that I thought Targetti and I could have collaborated. His mastery of Kaldor, supplemented by my sympathies for Kaldor's visions; my 'mastery' of Goodwin, coupled to his deep interest and attachment to Goodwin's Marx-Schumpeter²² world of capitalism's contradictory dynamic contours, may have been the source of a happy collaborative effort.

When I went to see Kaldor at his home in Adam's Road, Tibor Barna was there, looking completely at home – as anyone who visited that sprawling, warm home felt.

²² Although Goodwin never expressed open disagreement with Kaldor's visions, on growth or cycle theory, in personal conversations he was less than happy – to put it mildly - with Kaldor's neglect of Schumpeter's maxim: the cycle is a manifestation of growth'. Kaldor (1954) is replete with unwarranted criticisms of the Goodwin approach to growth cycles, underpinned by Schumpeter's theory of innovations, and even more, scathing, attacks on Schumpeter's theory itself (ibid, p. 53):

“[I]t is not possible to make the [Schumpeter] story as a whole into a 'model' (meaning by a model the sum total of assumptions which are just sufficient - no more no less - together to provide the necessary and sufficient conditions for the generation of a recurrent cycle with a clear periodicity) without incorporating into it elements which would suffice by themselves to explain the cycle -- without recourse to Schumpeter's own stage army of initiators and imitators, or even the very concept of technical progress.”

Two comments are in order: one, how does Kaldor know that 'it is not possible to make the [Schumpeter] story as a whole into a model'? Is this an 'impossibility theorem', within some mathematical formalism of theories and models? Secondly, it is precisely the construction of a 'model' to encapsulate the 'Schumpeter story' that was attempted and achieved in Goodwin (1946) - but, of course, not 'with a clear periodicity, which was not a criterion in the 'Schumpeter story'.

It was not to be – at least not in the past; perhaps I will be inspired to work with Targetti's inspirational spirit along that path that we sometimes spoke about – for over a quarter of a century.

Yet, we kept in touch, and on those rare occasions when our presence in Trento coincided, we had long and interesting conversations – mostly Ferdinando updating me on the events of the world, against the backdrop of history. In one wonderful conversation, over dinner, not too many years ago, he explained to me French politics, policy and visions in terms of a reincarnation of *Jean-Baptiste Colbert's resurrection as Nicolas Sarkozy's official 'muse'*. It was vintage Targetti, full of humour, tinged with scholarship in the narrative that placed current dilemmas in the way they were approached and resolved in a society's past, from which it could not – often, would not – run away. Indeed, the way he would structure his narrative, it was as if any society's political traditions cast a spell on the visions it was able to devise, at any one point in time.

This was a healthy and wise antidote to the biologically determined, evolutionary mania that is driving the social and humanistic sciences to embrace, mindlessly (sic!), *neuromania* as the panacea for all and every policy dilemma facing the politician and the poor rational fool, that underpins economic theory.

I am sure the noble spirit of Targetti would have abhorred these new developments that are driving economics, politics and political economy away from their noble humanistic and moral traditions – those that his teachers at Cambridge, who were also mine, tried to impart to us, as their students, and we, in turn, are obliged to pass on to our students.

This he did with unswerving commitment, as a colleague, as a scholar, as a friend and, above all, in a Gentlemanly way.

I can do no better than end with some of Tennyson's lines from *In Memoriam A.H.H.*:

*I falter where I firmly trod,
And falling with my weight of cares*

*Upon the great world's altar-stairs
That slope thro' darkness up to God.*

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ADDENDUM

In my reconstruction of the origins of macroeconomics the key pioneers are Lindahl, Kalecki and Keynes²³, in that chronological order. Thus, one of the great perplexities of Keynesian and Post-Keynesian economics – at least for me, personally - is why it took almost half-a-century for Kalecki’s review of the *General Theory* to be translated into English (Targetti & Kinda-Haas, 1982) and for Lindahl’s view of the *Keynesian System* to have been completely ignored (Lindahl, 1953)²⁴. My intention here is not to try to unravel this perplexity. My aim is simply to make a few classificatory and explanatory notes so that a future generation of Keynesian, Kaleckian and Stockholm School scholars may not forget or ignore these classics.

Unfortunately, in the reprinting of Kalecki’s review of the GT, in Kalecki (1990; Part 5, first chapter), the editor, Jerzy Osiatyński, omits the comprehensive, rich, *Introduction* (§I) and the *Bibliographical Note and a Comment* (§III) by Targetti and Kinda-Haas (for the rest of this addendum referred to as T&K-H). Instead the editor chose simply to ‘summarise’ them (ibid, pp. 509-510), thereby doing a disservice to both Keynes and Kalecki scholars.

A. Three points of ‘Swedish’ clarifications may make the Introduction more complete and correct:

- I. In the opening paragraph, p. 244, T & K-H, state: ‘Lindal (sic!), Ohlin and Lundberg were also working on similar lines [to Myrdal, 1931].’ The key figure, building the bridge between Lindahl and Myrdal, on the one hand, and Lundberg, as the ‘culmination’ of the ‘disequilibrium period analysis’ of the Neo Wicksellians, was Hammarskjöld (1933). Ohlin was, in this respect, quite marginal²⁵.

²³ I do not consider Hayek as one of the pioneers of Macroeconomics. Frisch comes close to making the triumvirate a quartet, but in my opinion he owed too much to the Swedes – particularly Lindahl – that I do not feel able to include him in the list of pioneers (see Velupillai, 2009).

²⁴ It remains a mystery, too, that Keynes himself never reviewed, in any meaningful way, any of *Lindahl’s classics*, nor reflected, in any published way, Kalecki’s classic contributions to business cycle theory. Ohlin was not quite the ‘insider’ to the development of the Macroeconomics of Stockholm School, nor did many of the ‘young Turks’ feel Ohlin’s representation of their work in monetary and business cycle theory in his debates with Keynes was faithful to the Neo-Wicksellian work they were doing, as is usually made out in the Anglo-Saxon literature (see, Velupillai, 1988).

²⁵ In an uncharacteristically pungent letter to Hammarskjöld, dated 13th March, 1932, Lindahl wrote: ‘Even Ohlin is *now* trying to learn monetary theory ...’ (my translation from the original Swedish; letter deposited in the Lindahl Archives at his family home, where I worked in the early 1980s). See also Velupillai (1988, footnote 6).

- II. In the same paragraph T & K-H state: “Frisch, however, had applied his model [Frisch, 1933] only to shipbuilding cycles while Kalecki’s model was related to the whole economy.” There was – and there remained – a long and distinguished tradition of modelling shipbuilding cycles by Norwegian economist, partly in the technical (not political economic) Marxian tradition of reinvestment cycles, especially under Frisch’s direction at Oslo (see, for example, Einarsen, 1938). But the classic **Cassel Festschrift** article by Frisch was explicitly Macrodynamic in the same sense in which Kalecki’s classic of 1935 was. It is possible T & K-H were thinking of Tinbergen’s classic on *Ein Schiffbauzyklus* (Tinbergen, 1931), the fountainhead of mathematical business cycle theories, in this writer’s opinion.
- III. I conjecture that T & K-H would welcome the comprehensive demonstration by Zambelli (2007) of the infelicities in Frisch (1933), which places his critique, at the Leyden meeting of the Econometric Society, in September-October, 1933, of Kalecki’s structurally unstable model, in proper analytical perspective! In a sense, both were guilty of the same kind of analytical ‘sin’, as incontrovertibly demonstrated by Zambelli (op.cit).
- IV. Finally, with respect to the second full paragraph on p.244, it may be of some help to the uninitiated reader, if there be such left in the profession, to refer him or her to Lundberg (1996, particularly, pp. 99-100 & 119-120) for a full report of the interchange between Targetti and Lundberg on Kalecki²⁶ and his sojourn in Stockholm, in 1936.

Explanatory notes on Lindahl’s two part reflection *On Keynes’ Economic System* (Lindahl, 1953):

- I. Some interesting points, relating to the way Lindahl came to a serious reading of the *GT* is described with sensitivity and finesse by Bent Hansen in his letter to me, of

²⁶ Indeed, in his thesis of 1937 (Lundberg, 1937), Kalecki is referred to as Kalecky! Incidentally, Richard Goodwin, for his lectures on economic dynamics at Cambridge – those that Targetti and I regularly attended - would begin by writing up, on an old-fashioned blackboard, with old-fashioned white chalk, just three ‘recommended’ texts: **Schumpeter, Kalecki and Lundberg!** In December, 1973, with a recommendation from Goodwin, I made an appointment to see Lundberg at his office in Stockholm, at the Stockholm School of Economics. The appointment date, chosen by Lundberg, was the afternoon of 23 December; I turned up at the exact hour – but he was not there! I waited for a while, and then left, heading for the subway trains to take me back ‘home’. There, at the station, on the other side of the platform, I saw the impassive figure of Erik Lundberg, waiting for the train going in the opposite direction!

January 2, 1985, which is included here, as Appendix I. This letter should, ideally, be read together with the brief section on Keynes (§8, Ch. VII) in Myrdal's **Hur Styr Landet** (Myrdal, 1982).

- II. In this much neglected minor classic by Lindahl – a master expositor of complex ideas in deceptively elegant prose, much in the mode of John Hicks – he uses a series of ingenious and unusual diagrams to make his arguments persuasive (knowing, as always, the limitations of two-dimensional graphical expositions). In footnote 1 on the second page of the article he refers to his indebtedness to an article by Ira Scott (1950-51). To the best of my knowledge, the genesis of the diagrammatic technique used by Lindahl, ostensibly deriving from Ira Scott, has never been explained. Since the story of its origins are both very personal and somewhat painful for the true inventor of the particular diagrammatic technique, and since the inventor was a close friend and teacher of both Targetti and myself, I thought I might tell the story of its genesis to settle priorities once and for all!

In May, 1985, Geoff Harcourt sent me a reprint of his wonderful portrait of Richard Goodwin, referring to him, in the title, as *A Twentieth-Century Eclectic* (Harcourt, 1985). On pp. 415-6, he states:

“At Harvard, Goodwin took part in the debate about Keynes. He was assistant to John Williams and taught Keynesian economics as part of a money and banking course. (Goodwin used a four quadrant, rather than the Hicks-Hansen two quadrant, diagram which he never published, though one of his students – he forgets who – did.)”

I wrote almost immediately to Harcourt, on the 3rd of June, 1985, as follows:

“I think I can enlighten you on who the student was! I am working on a monograph on the Contributions of Erik Lindahl (with full blessings and cooperation from Mrs Lindahl ...). One of his fundamental Keynesian papers was, in fact, published in the *Economic Record*. In that Lindahl used the ‘four quadrant’ technique and referred to a paper by Ira O. Scott in the RES, Vol. XIX. ... Footnote 3 on p. 13 of Scott’s paper provides a solution to the above query:

“After preparing the first draft of this paper, the author benefitted greatly from reading an unpublished manuscript in which Professor Goodwin presents a slightly different version of the Keynesian system in diagrammatic form.”

A few months ago I showed this to Goodwin who, then, remembered that it was, in fact, Ira Scott. This was, obviously, after your interview so that he

couldn't enlighten you at that time. In any case my own discovery was an entertaining process. Lindahl's path to the writing of the article I have cited above is even more interesting. I have had long correspondences with Bent Hansen and Don Patinkin about it²⁷."

I sent off a copy of my letter to Harcourt, almost immediately, together with one of my regular (and frequent) letters to Goodwin. He responded, immediately²⁸
(Goodwin, 1985):

"I was interested by your letter to Geoff. In talking to him I had forgotten you had uncovered the name of my pupil Scott. He was intellectually dishonest in an effort to promote his own originality. He attended my lectures and published that diagram, which I believe was essentially the same as my own, afterward! I developed it as a teaching-aid and only gradually, or subsequently, realised that it was simply an elaboration of Hicks' IS*LM. Possibly for that reason I never published it, but more likely because it was simply good for teaching the G.T. ----- and therefore of limited interest. I used it an elaborated cob-web, giving a cycle which was asymptotic to equilibrium. It only became really interesting if one added, as did Harrod, Kalecki, and later Kaldor, the accumulation process. And that was what I was interested in --- trying to formulate a model which would show that Harrod was right and Tinbergen wrong in that rather brutal review he [Tinbergen, 1937] wrote of Harrod's book²⁹. That is what I should have said and not what Geoff reports me (quite possibly correctly) as saying -- as you point out."

²⁷ The letter from Bent Hansen, appended below, is part of this correspondence; I am not including the Patinkin part of the correspondence for aesthetic and ethical reasons.

²⁸ Those were the days, in those pre-email halcyon age, when the mailman's 'horse & cart' reigned supreme, the old Remington's ruled and the fountain pen and bond paper were treasured possessions, whereby the brain in the hand was exercised at leisure.

²⁹ The 'rather brutal' sentence, in Tinbergen's review, to which Goodwin refers is (ibid, p. 90; italics added):

"Die Kombination also der 'relation' mit dem Satz über den 'multiplier' in der oben beschriebenen Weise gibt essentiell *keine Theorie des Zyklus*, und zwar ohne Rücksicht auf die gestalt der Funktion $\varphi(x)$."

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APPENDIX