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Issue 1
2012

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CONTENTS

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Welcome to the first 2012 edition of Creative Distraction!

While you spend a mere matter of days trying to cram a semester worth of courses, we proudly bring you the first edition of Creative Distraction for 2012. Creative Distraction aims to publish exceptional and insightful articles, essays and reviews to all those at UQ who enjoy reading about the bizarre topic of 'economics'. We have selected just a few of the highest quality articles for your reading pleasure.

This edition has more than just articles and essays, however. Did you ever want to get to know your lecturers better, but just couldn't find the time? Well, we've got interviews with two notable UQ economics academics who gave us some of the most economical answers we've ever seen. We've also got a book review, so that once you throw down your last exam and hurry back to your mahogany-panelled, leather sofa reading room, you'll know what book to pick up next. Plus the highly anticipated page of econ-comical material is included, just so you know.

A huge thank you to those who contributed to this edition: Professor John Quiggin and Associate Professor KK Tang for their interviews; Ben Jackman, Brendan Markey-Towler, Andrew Staib and Will Isdale for their contributions; and the School of Economics and the BEL Faculty for their ongoing support.

Thank you also to all of those who submitted articles, it is unfortunate we could not publish more. Please keep an eye out during semester two for your chance to contribute an article to the second edition. You can also get your name in a coveted UQES publication in another way by submitting a course review for the 2012 BEcon Guide: head to our website (uqes.com.au) for the course review link.

We wish you all the best with your last-minute study and hope this edition is either a joy to read and/or a useful procrastination tool.

Best of luck with your exams!

Rachael Fitzpatrick and Carl Tessmann
Publications Officers

Global Macroeconomic

by Andrew Staib

*Throughout the first decade after 2000, the United States ran enormous current account deficits. China, the rest of East Asia and the oil exporting countries ran correspondingly large current account surpluses. Andrew Staib discusses whether these global macroeconomic or current account imbalances contributed to the Global Financial Crisis (GFC) in 2008.**Throughout the first decade after 2000, the United States ran enormous current account deficits. China, the rest of East Asia and the oil exporting countries ran correspondingly large current account surpluses. Andrew Staib discusses whether these global macroeconomic or current account imbalances contributed to the Global Financial Crisis (GFC) in 2008.*

What caused the GFC has generated a large amount of debate. Poor financial practices, a lack of effective prudential oversight and loose monetary policy are among the many theories which have been put forth. The large global macroeconomic imbalances, which have built up to unprecedented levels in the last two decades, have also been suggested as one of the root causes of the GFC. The idea of global macroeconomic imbalances refers to the large current account surpluses being run by countries such as China, Germany, East Asia and the commodity exporting countries at the same time as large current account deficits are being run elsewhere in the world; principally by the United States (US), but also in the United Kingdom, Italy, Greece and Spain. While it cannot be said that these global imbalances were the sole cause of the GFC, they were at least a contributing factor.

The US was ground zero for the GFC. The collapse of the US property market sparked financial turmoil around the world that is still yet to be resolved. Though not the sole deficit running country, the US is by far the largest contributor to total global current account deficits, and so the analysis will mainly focus on it. Any current account deficit is necessarily financed by an associated capital account surplus. This capital was provided by those countries running current account surpluses. Whether or not the capital inflow into the US is the result of excessive savings in surplus countries, a burgeoning fiscal deficit in the US or some other cause is discussed in question b. What is important is that massive amounts of capital were flowing into the US as a result of these imbalances. The main effect of such an inflow was to push real interest rates in the US to abnormally low levels. It could be argued that extremely loose monetary policy early in the last decade, as a result of the September 11 attacks and the dot.com bubble bursting, were the principal cause of low interest rates. However, the suggestion that the large inflow of capital into the US had an insignificant effect on interest rates would be an exceedingly difficult position to defend.

Falling interest rates had far reaching effects on the US financial system. Much of the capital inflow was directed towards US Treasury notes and bonds. Traditionally, these are seen as safe haven assets. As foreign investors purchased large volumes of these assets, the yield on them fell significantly. As a result, any investor seeking higher returns would have to invest in assets with higher risk. The flow of investors towards higher risk assets resulted in the yields on them falling as well. This led to a general underpricing of risk in the US financial system, although it was particularly prevalent within the housing and real estate sector. The excessive risk associated with these investments proved extremely costly as default, principally mortgage default, became commonplace, setting the stage for a wider crisis.

Falling interest rates also contributed to an investment boom, as it allowed people to borrow at low cost. This low cost capital largely flowed into

the real estate sector, and a housing boom ensued. In the years leading up to the crisis, housing prices appreciated considerably and the number of new houses being built increased considerably. Such was the size and consistency of the increase in prices, that expectations of continued appreciation became embedded in the system.

Lenders of finance let their standards slide, as they believed the value of the house would be more than sufficient to pay off the mortgage in the case of default. Such dubious practices became widespread, and countless people, who under normal circumstances would not qualify for a loan, were being financed. Widespread default followed and, as a result, the supply of housing in the US increased dramatically, causing the unsustainable housing bubble to burst. Prices began to fall, so much so that the value of the house was not sufficient to cover the size of the mortgage. The sheer scale of the problem was something the US financial system (and indeed the global financial system) was unable to cope with.

The causes of the GFC were numerous. Loose monetary policy, a lack of financial regulation, and sub-standard lending practices are just some of the theories put forth to explain the crisis. However, the sizeable global macroeconomic imbalances which emerged prior to the crisis were also a contributing factor. The capital inflow into the US associated with these imbalances undoubtedly contributed to falling interest rates, which played a large role in precipitating the crisis.

MEET YOUR LECTURER

Professor John Quiggin

Courses taught in 2011:
Part of ECON2040 - Macroeconomic Policy

Recent Publications:
A prolific researcher, Professor Quiggin regularly updates his weblog (http://johnquiggin.com/) concerning current events and recently released a book on macroeconomic policy titled *Zombie Economics*.

Question Time

1. If you weren't an economic academic, what would you be?

Probably some other kind of academic.

2. What's your favourite area of study within economics?

All of them!

3. A person is at the level 2 entrance of Colin Clark and wants to get to Level 5. Should they take the stairs or the elevator?

Stairs.

4. Who is the person you'd most like to be stuck in an elevator with?

An elevator mechanic.

5 What's the most favourable quality in a student and what's the most irritating quality?

The most favourable is an interest in policy and the most irritating is 'bush-lawyering'.

6. Who would you rather be partnered with in a game of charades: Angela Merkel or Hillary Clinton?

Clinton

7. The cost of the three-year UQ Bachelor of Economics degree for international students starting in 2012 is $88,800. Is enrolling a rational decision?

Easy to get a 10 per cent return on that.

8. If the Eurozone ends up doing the hokey pokey, who will be out first?

Hopefully, the ECB.

9. "Wayne Swan: the world's best treasurer." A statement of truth, or the result of imperfect competition?

Arguably, both?

10. What is the most amusing exam question answer (or assignment) you've encountered?

Wot about the workers?

ECON-COMICAL...

A physicist, a chemist and an economist are stranded on an island, with nothing to eat. A can of soup washes ashore.

The physicist says,
"Let's smash the can open with a rock."
The chemist says,
"Let's build a fire and heat the can first."
The economist says,
"Let's assume that we have a can-opener..."

The difference between Solow and Friedman:
"....everything reminds Milton of the money supply. Well, everything reminds me of sex, but I keep it out of the paper."
(Robert Solow, 1966)

Q: What do you get when you cross the Godfather with an economist?

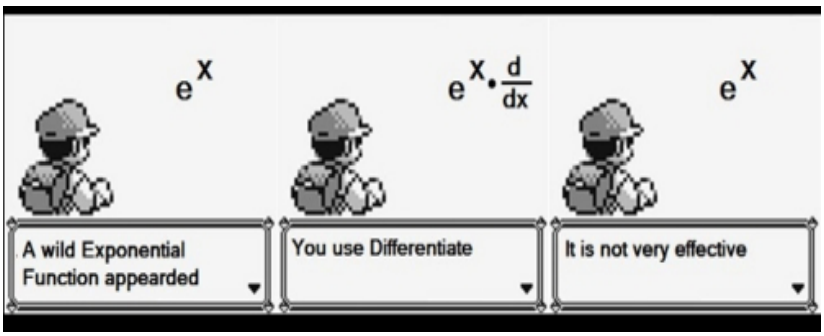
A: An offer you can't understand.

Did you hear of the economist who dove into his swimming pool and broke his neck?

He forgot to seasonally adjust his pool.

Two economics lecturers are chatting and one inquires, 'how's your wife?' The other responds, 'relative to what?'

For those of you who've enjoyed ECON1050....



On the Altar of Price Stability

by Ben Jackman

The United States Federal Reserve's famous 'dual mandate' establishes the goals of the country's central bank - to maintain price stability and achieve maximum employment. While its duties have expanded over the years, the Fed remains - at least on paper - steadfastly committed to these goals. Chairman Ben Bernanke, the Federal Open Market Committee (FOMC) and the 12 regional Fed Governors continually reaffirm this same commitment. Despite this, the policy actions of the Federal Reserve over the four years since the financial crisis of 2008 are not consistent with adherence to this mandate. In response to a significant contraction in output and corresponding increase in the unemployment rate in early 2009, the Federal Reserve began policy action that resulted in nominal interest rates falling to the zero lower bound and several rounds of unconventional monetary policy action through to 2011. Today, while inflation and expectations of inflation are well anchored at 2%, unemployment remains at approximately 8%, significantly higher than the structural range estimated by the Fed and implying that several million Americans are unemployed in excess of the natural rate. This paper will examine the policy action and communications of the Fed since the financial crisis and establish possible explanations for the failure of the central bank to act further to promote maximum employment. It will then consider alternative policy paths the FOMC can take to restore the central bank's credibility on the issue of unemployment.

The recession and subsequent period of weak growth that began in 2008 has been the worst period of economic performance in the US since the Great Depression. Both fiscal and monetary authorities responded to the crisis with wide a range of macroeconomic policy tools. These tools were variously designed to assist the financial sector, stabilise inflation expectations, extend temporary liquidity to large firms distressed by the collapse of money markets, and ultimately return growth to trend.

On the fiscal side, President Barack Obama signed the American Recovery and Reinvestment Act (ARRA) in February 2009, an $800 billion dollar fiscal stimulus package of tax cuts, transfers and government spending. This followed President George Bush's $700 billion dollar Troubled Asset Relief Program (TARP) in late 2008, designed to stabilise bank balance sheets.

The FOMC began 2008 by cutting the Federal Funds rate from 4.25 to 3.5%, citing concerns about a slowdown in housing. By December 16 of that year, the committee had cut rates to the zero lower bound. Despite this aggressive easing, the housing crash, shock of the financial crisis and the collapse of Lehman Brothers resulted in five consecutive quarters of negative growth, with real GDP contracting an astonishing 8.9% in the fourth quarter of 2008 alone.

Faced with rapidly falling inflation expectations and preliminary estimates of a strong economic contraction, the FOMC began its first round of quantitative easing in December 2008. It initially announced a purchase of $600 billion in agency mortgage-backed securities (MBS), and on March 18, 2009, announced further purchases of $850 billion in MBS and $350 billion in Treasury bonds. Asset purchases in this first round of quantitative easing were halted in April 2010, after what some on the FOMC considered improving macroeconomic indicators. However, by November, economic conditions had again faltered, with core inflation dropping as low as 0.6%. The Federal Reserve announced a further $600 billion in new Treasury purchases and $300 billion in reinvestment of proceeds from previous asset purchases. This latest round of purchases was nicknamed 'QE2'. The Federal Reserve's balance sheet has expanded to $3 trillion dollars as a result of these asset purchases, from a base of just under $1 trillion in early 2008.

The Federal Reserve completed these two separate rounds of asset purchases over the cycle, in both cases in response to worsening economic conditions. Chung et al (2011) discuss the expected ongoing effects of the purchases in detail, and state

that: "in particular, model simulations indicate that the past and projected expansion of the Federal Reserve's securities holdings since late 2008 will lower the unemployment rate, relative to what it would have been absent the purchases, by 1½ percentage points by 2012. In addition, we find that the asset purchases have probably prevented the U.S. economy from falling into deflation."

Notably, all authors of the paper are senior economists at the Federal Reserve, either on the Board of Governors or at the San Francisco branch. In both cases, the FOMC's decision to begin a round of quantitative easing has been prefaced by a fall in inflation expectations. Clearly, the FOMC is committed to defending the inflation side of its dual mandate, and is willing to make large assets purchases to do so. However, the monetary easing has been insufficient to promote a full recovery in unemployment.

Total core inflation in the United States from July 2008 to May 2012 has been just over 4%, or slightly more than 1% annualised. This rate of inflation is the lowest in any comparable post-war period. Combined with falling real GDP levels through 2008 and 2009, the result is that nominal GDP (NGDP) fell rapidly. While NGDP growth has turned positive, NGDP trend is at a significantly lower level, representative of the large output gap. Scott Sumner (2012) has argued convincingly that NGDP and inflation are the best metrics for measuring the stance of monetary policy, and the fact that Ben Bernanke espoused an identical view in a 2003 speech on monetary policy strengthens his argument significantly. NGDP falling off trend and very low inflation clearly indicate that monetary policy in the US has been excessively tight over the last four years.

Looking forward, the Federal Reserve's signalling about the future path of policy has in some cases been inconsistent. Mark Thoma (2012) has noted that while members of the FOMC insist the 2% inflation goal is a symmetric target, all projections for inflation made by the individual members of the committee are for less than 2%, indicating the Fed is behaving as though it targets an inflation ceiling .

Furthermore, while the committee has made a discretionary commitment to maintain a zero interest rate policy until early 2014, a recent survey of forecasts for interest rates made by the individual members of the committee was inconsistent with this policy. The average of the forecast for December 2013 was 125 basis points, with a median of 100 basis points. The median forecast for unemployment for the same time period was just under 8% (Federal Reserve Bank of Chicago, 2012). This implies that despite the commitment, and despite expecting high unemployment, a large cohort of the FOMC individually expect significant policy tightening in the near term. The FOMC's own commitment to future policy is not credible.

The Federal Reserve's large and unconventional monetary response to the 'Great Recession' has given some the impression that all monetary policy measures have been effectively exhausted, or can have no further effect on unemployment. Some believe that the economy has made a permanent adjustment to a significantly higher level of structural unemployment, generally referred to as the 'structural hypothesis'. Others have argued that the $2 trillion dollar expansion of the Fed's balance sheet without major inflationary effects must mean that the central bank is 'pushing on a string' and is incapable of stimulating the real economy. Neither of these explanations are satisfactory in light of the evidence, both historical and contemporary.

The structural hypothesis posits that the Non-Accelerating Inflation Rate of Unemployment (NAIRU) has moved permanently higher as result of the recession, and that any further attempt by the Federal Reserve to boost aggregate demand would accelerate inflation and cause malinvestment. The argument for this hypothesis has been made both from a Real Business Cycle perspective, as well as from the perspective of a large structural adjust-

ment unique to this recession. Proponents of the structural hypothesis propose cutting unemployment benefits and significant supply-side reform. Paul Krugman (2012) has noted that Bureau of Labour Statistics data does not show reallocation of resources in the labour market consistent with this explanation. He has also noted that similar structural arguments made in 1939 were soon proven wrong by the events of the next decade (Krugman, 2012). Critically, the FOMC does not hold the view that the cause of high unemployment in the US labour market is structural. Vice Chairman of the Federal Reserve Janet Yellen was unambiguous in a January 2011 speech,

"In sum, while deficient labor demand may not be the only factor boosting unemployment currently, and while disentangling the various influences on unemployment is not straightforward, weak labor demand appears to be the predominant factor keeping the unemployment rate elevated. This weakness, in turn, implies that current resource utilization is likely well below normal levels…"

The FOMC is thus convinced that the current level of high unemployment is primarily a result of demand deficiency.

The second hypothesis - the idea that the Fed may be 'pushing on a string' - is more complex. Bernanke and the FOMC have continually stated that they have been 'extraordinarily accommodative' of the weak labour market, by maintaining low interest rates and engaging in unconventional monetary policy. They point to the enormous expansion of the central bank's balance sheet to $3 trillion dollars due to assets purchases, and cite it as evidence of their monetary easing. Despite this, unemployment remains at approximately 8%. This problem of expansionary monetary policy being ineffective at the zero lower bound was first studied in detail during Japan's experience of deflation in the 1990s. The credibility hypothesis popularised by Paul Krugman (1998), Lars Svensson (2006) and Ben Bernanke (Ball, 2012) stated that without a credible commitment from the Bank of Japan to a future policy path that lowered real interest rates via higher inflation, the economy would not escape the zero lower bound. As a result, some have argued that the Fed under Bernanke must be attempting to achieve higher inflation, and is unable to.

This argument - that the Federal Reserve is incapable of raising private-sector expectations of the future price level, as evidenced by the muted response of inflation expectations to quantitative easing - is unconvincing. Both rounds of quantitative easing were prefaced by falling inflation expectations that immediately began to trend upwards when the new asset purchases were announced. Furthermore, internal analysis by the Fed determines that asset purchases were likely to have saved the US economy from deflation (Chung, 2011). A clear historical example of large expectation shifts is Roosevelt's price level target in 1933, achieved by a round of quantitative easing involving purchases of both monetary assets and domestic gold stocks (Eggertsson, 2008). Clearly, the Fed's control over inflation expectations and its commitment to that half of the dual mandate is strong.

Ben Bernanke's position in the early 2000s was that the zero lower bound could be easily escaped if policy was sufficiently credible, and that a central bank could never 'run out of ammunition'. His famous 'helicopter drop' quip emphasises his academic commitment to combating deflation. During his early years at the Federal Reserve however, his views began to change, and in a recent exchange at a press conference asserted that pursuing higher inflation would be 'reckless' and could jeopardise the central bank's 'hard won' credibility on inflation (Bloomberg News, 2012). No doubt several million unemployed Americans would disagree.

The Fed's overzealous commitment to an inflation point target, during a cycle with the lowest total inflation in the post-war period, is restricting the economic recovery. With the Fed pursuing a historically low inflation level, any asset purchases designed to lower real interest rates (which can only occur at the zero lower bound through rising inflation) will be ineffectual. Non-credible expansions of the monetary base at the zero lower bound can only be considered temporary, and therefore will not raise output. If the Fed is to significantly ease policy, it

will either have to raise its inflation target (as prescribed by Krugman, 2010), or engage in a policy regime change.

While raising the inflation target would likely be effective in lowering real interest rates, such a policy change faces several difficulties. Firstly, a discretionary change in a monetary policy target could potentially set a precedent the Federal Reserve is unwilling to set, perhaps amounting to admittance of some mistake. Secondly, simply changing the inflation target in response to this particular downturn does not address the larger limitations of the inflation-targeting regime in relation to the zero lower bound. Finally, changing the inflation target could expose the Federal Reserve to major political pressure from a Congress and Senate that have shown themselves to be extremely inflation adverse.

One alternative that has garnered attention is NGDP level targeting (NGDPLT), popularised by Scott Sumner of Bentley University. NGDPLT is an approach to stabilising macroeconomic outcomes by ensuring constant growth in nominal GDP, allowing for both inflation and real GDP to vary slightly to account for changes in output. Sumner's theory is that nominal shocks are the primary drivers of recessions, and thus that the current malaise is caused by excessively tight monetary policy, since the Federal Reserve is not willing to return the economy to trend growth in NGDP (2011). Implicit in a level target is the idea of 'catch-up' – if NGDP growth was 4% in one year, the central bank would target 6% NGDP growth the next. This flexibility would short-circuit the issues brought about by inflation targeting at the zero lower bound, as long as a central bank continues to credibly target the forecast of NGDP growth. The Sumner Critique is rapidly growing traction in monetary policy circles, with one member of the FOMC already tentatively endorsing the concept (Thoma, 2012). Some other alternatives to inflation targeting exist, but none with the complete conceptual background of NGDPLT (Sumner, 2011).

While the focus of this paper is monetary policy, convincing arguments for further fiscal stimulus can be made if the Federal Reserve is unwilling to change its current policy path. As suggested by Brad Delong and Larry Summers (2012), fiscal stimulus could possibly be self-financing in a depressed economy. Paul Krugman has also noted that while the Federal deficit has increased significantly as a result of the effects of the recession, real government spending on goods and services declined 2.6% from 2009 to 2012, indicative of a slight contraction in public sector purchases over the cycle. Simon Wren-Lewis has argued that over-shooting with fiscal stimulus when monetary policy is at the zero lower bound carries less policy risk than undershooting, as interest rates can counteract excess fiscal stimulus but cannot be lowered further to account for an undershoot (Wren-Lewis, 2012). Importantly, this discussion must be considered in light of the fact that the borrowing costs the US Treasury faces are at historic lows. Demand for US debt is so strong that investors have been willing to purchase newly issued Treasury bonds at an inflation-adjusted loss. Given impotent monetary policy, fiscal stimulus is clearly still an option, although a central bank more willing to aggressively combat high unemployment would be ideal.

The Federal Reserve's excessive focus on inflation in the 'Great Recession' is one of the driving forces behind the high levels of unemployment in the US economy. An unwillingness to pursue monetary easing and adherence instead to the strict inflation-targeting regime has eliminated any chance of near term recovery. While a higher inflation target or shift to NGDP targeting would not be a panacea, a serious and credible change in the monetary policy stance of the Federal Reserve is a necessary condition for a rapid return to full employment. The current policy failure directly affects the lives of the millions of long-term unemployed Americans who cannot find work, primarily as a result of a monetary phenomenon. These unemployed are being sacrificed on the altar of price stability.

All general economic data, unless specifically referenced, is taken from the St Louis Federal Reserve Economic Database (FRED), http://research.stlouisfed.org/fred2/

MEET YOUR LECTURER

Associate Professor KK Tang

Courses taught in 2012:
ECON 1020 - Introductory Macroeconomics

Recent Publications:
Carmignani, F., G. Lordan, and K. Tang, (forthcoming), "Does aid for HIV respond to media pressure?" Health Economics, forthcoming.

Tang, K. (2011), "Correcting the size bias in trade openness and globalization measures" Global Economy Journal, 11(3): article 3.

Question Time

1. If you weren't an economic academic, what would you be?

An expensive academic.

2. What's your favourite area of study within economics?

International economics.

3. A person is at the level 2 entrance of Colin Clark and wants to get to Level 5. Should they take the stairs or the elevator?

Stairs - if the person has no physical difficulties in climbing up the stairs.

4. Who is the person you'd most like to be stuck in an elevator with?

No one in particular – that is why I always try to take the stairs.

5 What's the most favourable quality in a student and what's the most irritating quality?

Most favourable is diligence, most irritating is laziness.

6. Who would you rather be partnered with in a game of charades: Angela Merkel or Hillary Clinton?

Hillary – I can't speak German.

7. The cost of the three-year UQ Bachelor of Economics degree for international students starting in 2012 is $88,800. Is enrolling a rational decision?

It depends on whether you take my courses...

8. If the Eurozone ends up doing the hokey pokey, who will be out first?

Those with ability and means to emigrate.

9. "Wayne Swan: the world's best treasurer." A statement of truth, or the result of imperfect competition?

In a competition, it is all relative.

10. What is the most amusing exam question answer (or assignment) you've encountered?

Those that covered scenarios beyond the 'model answer'.

'Boomerang: Travel in the New Third World' - Michael Lewis

by Will Isdale

Australian's are uncomfortable with thinking that they've got it good. It offends our primordial inclination to bag our politicians. If - as many suggest – we're actually living on an island of luxury by worldwide standards, it becomes much more difficult indulge in that ritual. And that's, well, awkward.

Nothing has reinforced my view that we're doing 'OK' more than Michael Lewis's most recent book, 'Boomerang: Travels in the New Third World'. Given the political rhetoric on gigantic debts and government spending, Australian's might be surprised if they actually stood back and surveyed the post-2008 world before they lamented their own predicament. (Australia's debt as a percentage of GDP is the third lowest in the OECD, by the way).

'Boomerang' is so titled because, according to Lewis, the financial state of many countries today is largely the result of money thrown out in hope, and returning in anger. Chief among the boomerang-throwers are: Iceland, Greece, Ireland, Germany and the United States - each of which Lewis considers in separate chapters. Spare a thought for the Icelandic, for instance. From humble beginnings as one of the poorest countries in Europe (circa 1900), Iceland transformed itself into country with a wealthy and well-educated citizenry. By 2008, Iceland could proudly proclaim itself the world's most developed country (according to the UN's Human Development Index report that year).

But it wouldn't last. In late 2008, Iceland's quaint seaside capital of Rejavik would find itself occupied by IMF experts more used to deployment in failed African states. The financial mess that had been unleashed was out of all proportion to what could be expected from a country of 300,000 citizens. As Lewis writes:

"In the end, Icelanders amassed debts amounting to 850 percent of their GDP. (The debt-drowned United States has reached just 350 percent.) As absurdly big and important as Wall Street became in the U.S. economy, it never grew so large that the rest of the population could not, in a pinch, bail it out. Each one of the three Icelandic banks suffered losses too large for the nation to bear; taken together they were so ridiculously out of proportion that, within weeks of the collapse, a third of the population told pollsters that they were considering emigration."

Consider also those scallywags of Europe – the Greeks. The more fiscally responsible European states (namely Germany) now foot the bill for Greece's profligate spending on government jobs (which pay roughly three times the average private-sector job) and government pensions. Consider, for instance, that Greece employs four times as many teachers per pupil than Finland (the OECD's highest performer in education). None of this is helped, of course, by the fact that tax collection in Greece is almost comically ineffective (almost, because it really is tragic). The Greeks never learned to pay their taxes because no one is ever punished for it. Lewis notes:

"The scale of Greek tax cheating was at least as incredible as its scope: an estimated two-thirds of Greek doctors reported incomes under 12,000 euros a year – which meant, because incomes below that amount weren't taxable, that even plastic surgeons making millions a year paid no tax at all."

Then there are the disaster zones of Ireland (which Lewis has a chapter on), Italy, Spain and Co. All of this brings tears to the eyes of committed EU believers – or at least to believers in the Eurozone. The poetry of a unified Europe has struck a note of discord, and it's been barely ten years since the Euro was introduced! All the while the UK will slap themselves on the back for their foresight, or perhaps their obstinacy, in sticking with Her Majesty's currency.

Boomerang is a great read. It's a book of intelligent macroeconomic reflection and entertaining travel anecdotes all rolled into one. You'll laugh, you'll cry, and you'll thank god that you live in Australia. **4/5 Stars**.

An Evolutionary Approach

by Brendan Markey-Towler

How to spread the phenomenon by which the industrial revolution lifted Europe and some of its favoured colonies out of agrarian subsistence to the developing world has been the subject of a vast literature on the economics of development. The intellectual framework for orthodox development theory and policy is largely based on the neoclassical theory of how per capita GDP growth can be sustained. It suggests that by imposing Western-style institutions such as free markets and property rights, self-organisation and productivity gains will lift the population out of poverty.

On the face of it, the approach seems to have worked remarkably well, particularly in China where opening up the markets has been the single most effective experiment in history (see Fishman (2006) for a narrative of market based reforms in China). Indeed, billions have been lifted out of the poverty traps which have characterised so much of human existence through the application of orthodox development theory (Collier, 2008). However, there is growing concern about the rise of other phenomena which have accompanied the escape from the poverty trap. There are increasing concerns about the highly inequitable distribution of gains from development in the least developed nations, as well as concerns about environmental degradation (van Griethuysen, 2002). Increasingly the question is being asked "at what price development?"

This essay will argue that policymakers can attain a more nuanced insight into the process of economic development which addresses such questions by adopting an evolutionary perspective on economic development. It will be argued that policies derived from the theory are more sophisticated policies for sustainable and consistent development, and have the great benefit of being suggested by the framework itself as opposed to the neoclassical paradigm where policies have to be devised from highly abstract theoretical results.

First we will discuss the scientific philosophy arguments for evolutionary development from.
We will then briefly explore the essence of neoclassical growth theory and its policy prescriptions before progressing to the micro-meso-macro methodology as a framework for evolutionary thought. Finally the major development policy concerns where both orthodox and evolutionary development can make contributions will be discussed before we explore some areas of development neoclassical growth theory has little to offer.

Scientific Philosophy: Why scientific realism?

As suggested above, mainstream development theory is based on the neoclassical theory of long-term economic growth, which justifies its heuristics by Milton Friedman's famous argument for predictive science. Friedman argued in his classic 1953 essay The Methodology of Positive Economics (Friedman, 1984) that positive economic science aims for prediction rather than explanation per se and with the simplest model possible. Economic agents can then be said to act "as if" they are rational optimisers.

Beinhocker (2011) suggests that, in fact, the neoclassical economics justified by Friedman's scientific philosophy is in fact neither realistic nor predictive. He points out that many rational agent models fail empirical validity tests.

The author has argued previously (Markey-Towler, 2010) that scientific heuristics should aim to not only predict, but also explain the causal processes underlying economic phenomena. Despite the fact that any theory necessarily abstracts from reality to some extent in order to make progress, an explanatory heuristic is more likely to be empirically valid because the search for explanatory power will likely reduce omitted variable bias as a matter of principle.

Tony Lawson in Reorienting Economics (2003) makes the argument that scientific heuristics must match the ontology of the phenomena it explains. Foster (2005) makes the argument that the economy should be conceived of not as a system of general equilibrium as in Arrow & Debreu (1954) but rather as a self-organising and constantly adapting system of "4th order complexity". Accordingly, an evolutionary heuristic is appropriate for understanding an evolutionary system.

Neoclassical growth theory

We can observe the ontological disconnect of neoclassical growth theory by exploring the foundations of the analytical framework. Long-term growth theory is largely based on the seminal paper by Solow in 1956. Suppose there is a representative firm producing a single good Y_t which may be consumed or saved and used for further production. The majority of the literature gives this firm the Cobb-Douglas production technology with constant returns to scale in capital K_t and labour L_t:

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$$

where A_t is total factor productivity. Taking logs and differentiating in time yields

$$\frac{\dot{Y}_t}{Y_t} = \frac{\dot{A}_t}{A_t} + \alpha\frac{\dot{K}_t}{K_t} + (1+\alpha)\frac{\dot{L}_t}{L_t}\,1$$

This can be rewritten in per capita terms (assuming no unemployment) as

$$\frac{\dot{y}_t}{y_t} = \frac{\dot{A}_t}{A_t} + \alpha\frac{\dot{k}_t}{k_t}$$

Capital per capita is assumed to grow at a differential rate dependent on the savings rate s and the rate of depreciation ***d***

$$\frac{\dot{k}_t}{k_t} = sY_t - \left(d + \frac{\dot{L}_t}{L_t}\right)$$

Under these conditions, it can be shown that "the economy" will converge to a steady state equilibrium of no per-capita income growth unless the "technology" parameter grows. The original Solow model assumes a constant rate of technological growth $\dot{A}_t/A_t = g$ an obviously unsatisfactory theory because it explains growth by assuming growth. This spawned a great deal of literature on how "knowledge externalities" could generate economy wide increasing returns to scale (Romer, 2006).

The most sophisticated neoclassical approach to growth is most likely that developed by Aghion & Howitt (1992) with their "Schumpeterian" model. They make the growth process completely endogenous by splitting the production economy into "firms" and "research and development" who aim to maximise profits in any given period. The R&D firm aims in each period to provide a new quality technological good (analogous to capital) with a higher quality productivity At by investing in the creation and application of knowledge.

The failings of the neoclassical approach to explain the true functioning of the economy can be seen even from these foundations. Most obvious is the required assumption of representative agents to make the algebra tractable and in so doing closes off any possibility of accounting for the interaction of researchers and firms which we will see is actually crucial to the economic process.

Micro-meso-macro evolutionary framework

Perhaps the most coherent analytical framework for conceptualising the evolutionary economy is the micro-meso-macro framework laid out by Dopfer et al (2004). Within this framework the abstract and somewhat constructed level of meso-rules play the most important part in the process of economic growth.

The meso-rule and complex systems

A meso-rule is a generic rule for using energy to create a "dissipative" structure within an economy which is a complex system of 4th order complexity. By importing "free energy" and exporting entropic waste, connections between the nodes of

the system create economic value (Foster, 2005). Meso-rules may be physical technologies for combining inputs to create products, social technologies governing interaction of agents in the system, or business plans for linking these technologies to a market (Beinhocker, 2011). In "scale-free" networks, it is common to observe the formation of "hub" nodes because in such systems an element/structure in the system is more likely to connect to a more highly connected node (Schweitzer et. al. 2009).

Since the creation of new meso-rules is how new products, technologies and ways of interacting are generated, radical innovation which inevitably makes old rule redundant is vital to economic growth. In much of the original work on evolutionary economics, this process was explained as random mutation (Foster & Metcalfe, 2001). However, in 4th order complex systems, agents themselves generate knowledge for the creation of structure, and this process is interactive (Foster, 2005). They do so simply because they are driven by the profit motive (Foster, 2011a).

As Hayek rightly observed, the market process generates spontaneous order within the economic system. Foster (2005). Entrepreneurs within the system strive often as a team to generate "mental maps" for a new meso-rule to generate economic structure. In reality they operate under conditions of radical uncertainty, and so cannot act as rational optimisers as in Aghion & Howitt (1992) but are much more driven by informed intuitions (Simon, 1955). This theory of innovation is very much in the style of Schumpeter, who argued that radical innovations introduced by entrepreneurs bring economic development through creative destruction (Fagerberg, 2003).

Of course, many meso-rules will be generated at any given time for similar goals (for example, we can travel by car, boat, train or plane), but only a handful will be retained. This process of selection is where demand becomes pivotal in the long-term growth of the economy, something ignored in neoclassical growth theories. The replicator dynamic is a biological analogy by which the process of selection can be expressed mathematically. If we define the share of output in the total generated through the application of a meso-rule i as z_i, Foster &Metcalfe (2010) show that we can describe the accumulation of market share as:

$$\frac{dz_i}{dt} = z_i(\psi_i - \psi_z)\hat{q}_e$$

where ψ_i is a metric of income elasticity of demand, $\psi_z = \sum_{i=1}^{n} z_i \psi_i$ is its output-weighted average and $\hat{q}_e$ is the average rate of productivity growth. We can see here that if the demand for a product is greater than the average, this meso-rule will become dominant through time. A point to which we will return is the importance in this process of variation, since as Silverberg & Verspagen (2005) show, the process of development of a meso-rule's "fitness" will stall as a dominant rule forces others into extinction.

Extensions to the micro and macro levels

At the micro level of the economy reader/builder agents take the "schema" encoded in the radical innovation and operationalize it (Beinhocker, 2011). Because of the application to a locality in the system and by the natural variation of the reader/builder there will be variation within the meso-rule itself. This is how incremental innovation builds upon the radical innovation constituted by the generation of the meso-rule. However, a "basin of attraction" exists about the meso-rule within which a variation can be effective. If the innovation falls outside this basin, it will fail because it is too varied to be operational (Foster & Wild, 1999). Typically the process of incremental innovation becomes endogenous, conforming to the theory of Schumpeter that large firms are entrepreneurial in applying radical innovations (Fagerberg, 2003).

At the macro level we have not merely an aggregation of the micro-agents, a point stressed by

Dopfer et al (2004). Instead, the macroeconomy consists of the coordination of meso-rules within the wider complex system of the economy. When meso-rules are being generated, selected and diffused constantly through time the macroeconomy grows in aggregate but is also changing structurally. The importance of thus structural change insofar as it reflects creative destruction and particularly interaction is largely assumed away by neoclassical growth theory.

The process of diffusion

If a meso-rule is surviving in the replicator dynamic process of selection it will begin to diffuse. During the diffusion process, the innovators' technology or plan will be adopted increasingly widely throughout the economy and productivity gains spread, generating economic growth. Again a simple mathematical tool can describe this process. Foster (2005) argues that the diffusion path of a meso-rule axiomatically follows a "logistic" path which can be characterised as follows. Let x_t be some metric of adoption (for example, sales figures) and k the "carrying capacity" for this technology, we can say

$$x_t = x_{t-1} + x_t \left[b \left(1 - \frac{x_{t-1}}{k} \right) \right] + \varepsilon_t$$

where ψ_t is a natural deviation from the strict curve. If we were to plot this curve we would see three distinct "eras" in the diffusion process at which point there is also activity at the micro and macro levels.

Origination: A radical innovation emerges and is applied by a few agents at the micro level. At the macro-level there is de-coordination of the old meso-rule framework. The basin of attraction is very small at this point and many variations will end in extinction, with little tolerance in the marketplace for variations (Foster & Wild, 1999).

Diffusion: The innovation reaches its "tipping point" where the bulk of agents at the micro level become aware of the benefits of the new technology and the meso-rule begins to gain supremacy in the replicator dynamics. Gladwell (2000) argues that this is the point where the innovation has reached a "hub" in the system from which it will spread more rapidly. The basin of attraction at the micro-level widens as suppliers compete first on differentiation and then as the diffusion inflection point is reached, compete on cost. At the macro level the meso-rule is being integrated into the re-coordinating system and structure is evolving accordingly.

Retention: The diffusion process converges to its carrying capacity, at the micro level the market is saturated and a few remaining monopolistic firms are competing strategically. At this point there will either be a bifurcation (collapse) of the meso-rule in the face of a new radical innovation or the rule will become "part of the fabric" and retained at the macro-level.

We now have a framework for understanding how economic growth occurs. Economic growth comes about because new and improved methods of going about economic activity are being constantly imagined and then applied. For the economy to grow it requires innovators and entrepreneurs who are capable of applying the meso-rule technology in their locality . The importance of knowledge and its application is also a key result of neoclassical growth theory. However, as we will see, the evolutionary approach again provides a more sophisticated and complete policy prescription in this regard.

Modelling

Before we explore development policies arrived at via the micro-meso-macro approach we need to acknowledge that the framework is not overly formal and is in no sense deductive in the manner of orthodox economics. It also does not present much in the way of prediction, but as pointed out by Silverberg & Verspagen (2005), evolution is inherently unpredictable so in fact neoclassical prediction has largely illusory power.

Nevertheless, it is possible to undertake modelling of sorts similar to the physical sciences. A popular method of empirical evolution is Agent Based Modelling such as in Malerba et al (1999) whereby we try to build an "appreciative" model of history based on the stylised facts of a particular event. From those stylised facts can be built a model of action for a set of agents and their interaction can then be simulated . To impose some structure so that we aren't purely calibrating to the results, Foster (2011) argues that we can glean some idea of parameter values by using econometrics.

Econometrics by itself can also be useful for evolutionary modelling. Steve Klepper pioneered the use of econometrics to model entry and exit through "risk functions", estimating the risk of exit in classic studies of the US tyre industry (Buenstorf & Klepper, 2010). Also, regression analysis can yield results by making the parameters of the logistic diffusion curve themselves endogenous. An "augmented" diffusion function can be estimated to give us ideas about what factors determine diffusion speed (b) and carrying capacity (k) (Foster & Wild, 1999).

To provide a disaggregated model of the macroeconomy we can use the "accounting" techniques developed by Metcalfe (2008) and applied explicitly within the micro-meso-macro framework in Metcalfe et al (2006) and Metcalfe & Foster (2010). Such models use analogies from mathematical biology to account for growth as a function of the productivity and interaction of industries within an economy which is constantly changing structurally.

A very recent and exciting method suggested by Beinhocker (2011) is to model the process of replicator dynamics by using the computing technique of a search algorithm across a "design space" of meso-rules and their micro-level applications. An algorithm is capable of producing results such as path dependence and history-contingent optimality in a realistic and powerful manner.

Development Policy

Now that we finally have a framework for organising thinking about the evolutionary process in all its complexity we can explore suggestions for development policy from the evolutionary perspective.

The Common Ground: Innovation Policy

Neoclassical policy prescription is driven by the need to increase $\dot{A}_t/A_t$. Even development economists who are ostensibly non-neoclassical in the strict sense such as Jeffrey Sachs (2008) suggest similar policies. Investment drives the differential equations written for technology and in developing countries savings can be used to purchase advanced technology to facilitate catch-up. At the same time this needs to be complemented by human and physical capital which gives a boost to technological advance through increased labour productivity. If savings are weak then aid or foreign direct investment can finance investment.

Policy developed from the evolutionary framework prima facie has the same aim & much the same prescriptions, however, they are more nuanced and rounded out. Moreover, many of the policy prescriptions are explicitly suggested within the model itself. In much of development, the development gurus discuss policy relies very much on observations external to the model with the outcomes of the policy capable of being seen ad hoc within the model. A case in point is Half the Sky by Nicholas D Kristof and Sheryl WuDunn, which sets out a manifesto for the socio-economic empowerment of women across the developing world. In orthodox growth models, we would simply see a doubling of L with little effect on per capita income. In the evolutionary framework by contrast, em-

powering women is to add new nodes and new connections to the complex system as well as provide a new and different group of growth driving entrepreneurs.

Returning to innovation policy, we know from our exploration of the micro-meso-macro approach above that knowledge is fundamental to economic growth. Research allows the generation of new meso-rules for the use of energy to create structure through connection of elements of the economic system. Indeed, one could make the argument that particularly in a 4th order complex system knowledge itself is a complex system and the task of entrepreneurs is to connect "nuggets" of knowledge into a new rule system. There is a case for government to complement private research with its own research and development (Nelson, 2002), particularly into areas which are unpalatable to the private sector but vital to the economy.

Innovation systems are thus crucial for the formation and application of new meso-rules which enhance the economy's long term prospects. An innovation system can be thought of as a "triple-helix" where universities, government and private laboratories generate knowledge and apply it (Johnson et al, 2003). While it should be obvious that investment in setting up these systems and providing them funding for research is crucial, the evolutionary complex systems approach suggests subtle policies which can be hugely beneficial and easily overlooked. In particular, Johnson et al (2003) observe that knowledge is generated by building on others' work and cannot be completely held in the head of one person, making interaction crucial. To this end, the generation of radical innovations can be fostered simply by ensuring that researchers have adequate access to shared, secure databases and can communicate regularly. Somewhat ironically, the theory suggests that economic progress can be generated by simply facilitating "talkfests" for entrepreneurial innovators where ideas can, as Matt Ridley eloquently puts it, have sex and reproduce. Certainly within developed nations there is a push towards a focus on national innovation systems based on such theories, and in Australia in particular the CSIRO has shifted its focus from direct innovation to supplementing the private sector and facilitating the generation of knowledge (Dodgson et al, 2011).

A system where new meso-rules are generated is certainly something which is needed for ongoing and sustained economic growth. However, Somalia doesn't need a Steve Jobs or Henry T Fords so much as people like Joseph Bazalgette (the legendary "Sewer King") and the small group of citizens who banded together to begin the Pacific Railroad in the US.

Johnson et al (2003) suggest that underdeveloped nations, rather than focusing on radical innovation instead focus on being able to adopt and incrementally innovate on others' meso-rules. In these systems, the meso-rule "originates" by importing the schema from abroad and focus is put on developing the capabilities to apply it in the locality and innovate incrementally at the micro-level. There is a direct link with the theory of Amartya Sen in Development as Freedom whereby development is conceived of as the unlocking of "capability" through investments in human capital. Here the state plays a major role in providing education to all in the population as far as they are able to take it. Aside from any altruistic motives, state intervention in education if done properly (admittedly a very big if in some developing nations) will ensure that creative entrepreneurs who would otherwise be trapped in poverty are able to unlock their capabilities for taking a schema for a meso-rule and "running with it".

Again we see that neoclassical based orthodox economic theory suggests much the same, but from the evolutionary perspective we have a more nu-

anced view which is a clear and explicit result of the micro-meso-macro framework. We also see the improvement on policies such as Sachs (2008) which advocates an "import it and they will come" approach to technology. Investment in human capital is crucial not for raising labour productivity per se but because it allows the importing of technology from abroad to be effective.

Recent contributions to the literature on evolutionary development have examined a key but as yet overlooked element of the theory of economic growth. Robert & Yoguel (2010) make an interesting argument that following the prescriptions of both standard and evolutionary development for the least developed nations is only really useful in getting such nations out of the poverty trap. To avoid the so-called "middle-income trap", the less developed nations need to begin thinking about developing their own innovation systems early in the process of development. If an economy is locked into a focus on being able to apply imported meso-rules at a micro-level that nation becomes dependent on another country's innovation system, an area in which it may not have long-run comparative advantage.

Robert & Yoguel (2010) argue that a country goes from being an importer to an originator of meso-rules when there is a "critical mass" of "rule-breakers" who are capable of conceiving new ways of going about economic activity. To thrive, these rule-breakers (entrepreneurs) need the system to have capacity to form connections between the various nodes and also the ability to absorb radical innovations. In short, the system needs to be able to integrate their innovations and a culture of creative entrepreneurship must be developed. Robert & Yoguel (2010) argue that this theory of progression can explain the Latin American experience of development. Essentially, there weren't enough rule breakers in their innovation systems that could help wean an economy off its dependence on the USA for the import of meso-rules. Cimoli & Katz (2003) provide evidence to this effect. They argue that by freeing international markets to Latin Americans, their economies became specialised in low knowledge generation, low value added industries where they could gain manufacturing business. This snared them in "low development traps" because systems of radical innovation were not capable of existing in the technology-import environment.

With the general policy prescriptions of evolutionary development theory in hand, let us now turn briefly to some areas of development policy where evolutionary economics explicitly suggests within the framework policies which have very little theoretical grounding in orthodox theory.

The role of inequality

In the pioneering work of Joseph Schumpeter we find cautions against powerful special interests and their resistance to creative destruction. Successful entrepreneurs eventually become monopolists, conservative and resistant to having their rents destroyed by new entrepreneurs (Fagerberg, 2003). Silverberg & Verspagen (2005) show that the replicator dynamic may be rewritten as the average "fitness" being directly dependent on the variance of fitness in the population , so that when variation goes to zero as the system naturally converges, the progress of the economy begins to slow. Thus rent-seeking behaviour by monopolists which prevents the generation of novelty needs to be curtailed to allow development to occur.

We also know from Foster (2005) that networks naturally form hubs, and when connections are the main source of value in the economic system, an element in the economy being a hub means financial and market power. When meso-rules have diffused to such a point they are typically in the saturation phase so the firms using them are now devoting their investments to strategy or rent-seeking, which is a direct drain on economic

growth (Foster, 2011b). Hubs also create vulnerability to a breakdown of the system resulting from the destruction of one node unless there is turnover in the creation of new hubs and expansion of the system.

Clearly there is a need for strong political institutions which will resist rent seeking behaviour and maintain competition in the marketplace for development to occur. Creative destruction must be able to operate for new meso-rules to be adopted. Another interesting policy suggestion is that in order to encourage turnover and variation to feed the selection process for new meso-rules, abnormal profits in the booming sectors should be redistributed to the innovation system in order to diversify the meso-rule network that constitutes the macroeconomy.

The role of institutions

The importance of institutions in the orthodox development approach is set out clearly by Dambisa Moyo (2009) when she argues that aid fails because poor institutions permit embezzlement. As much as $1trillion in aid has been passed to Africa and still there is widespread poverty and conflict. However, much orthodox work on the importance of institutions estimates a linear regression of economic growth dependent on some metric of "governance". Paul Collier (2008) rightly points out that for development to occur, the data says that good government must be present and recommends a set of international laws and charters essentially backed by Western military might.

Again, in contrast to the rather ad-hoc regression analysis of orthodox development theory, institutions as socio-political norms & customs (meso-rules) have a long history of explicit theorizing in evolution going back to Thorstein Veblen, who spoke of competing rules and norms for economic activity as the drivers of economic growth (Hodgson, 1998).

Ostrom (2000) discusses how the myriad rules and norms governing the socio-economic behaviour of individuals evolve from the interaction of those agents in attempts to cooperate and avoid the prisoner's dilemma of Dickensian predatory capitalism . She makes the observation that co-operation is more common than would be predicted by standard game theory, and this can be explained by including in player payoffs empathy, perceived fairness and the value of reciprocity. Ostrom & Basurto (2011) show how the process of evolving rules can occur and be measured in an algorithmic and game theoretical fashion. They famously use the example of Nepali farmers who generate elaborate rule systems to avoid over-irrigation. For institutions to develop, they argue, a long time is needed unless governments can actively get involved to speed up the process by facilitating dialogue of the concerned parties, committing to punishment and getting the parties to accept the "rule of law" as it were.

For development policy, this means that unless Western governments are Hobbesian Leviathans, a system of rules cannot be imposed on countries as Collier (2008) suggests. For development to work equitably and sustainably, the institutions of a market system must be developed through dialogue between governments and people. Failure to understand this could possibly explain the phenomenon of "crony capitalism" in the nations of the ex-Soviet Union who were subjected to laissez-faire "shock therapy".

Environmental Consequences of Growth

Finally let us turn to the question of sustainability in development. The environmental impacts of economic growth are sometimes captured by including natural resources in the production function. However, this depletion of natural resources approach certainly does not seem to have widespread use in less developed nations. China is famed for its pollution rivalling the pea-soup fogs of London while Brazil's Amazon is suffering

from ongoing deforestation despite national and international environmentalists' efforts to rein it in.

Within the evolutionary paradigm also, ecology has also been of less importance than perhaps it should be, with the exceptions of Nicholas Georgescu-Roegan and Kenneth Boulding (Foster, 2011a) That said, we know that the economic system is made up of dissipative structures (Foster & Wild, 1999). This means that like any other thermodynamic system, the creation of economic structures using free energy will also give off entropic waste. This is a necessary process, but can become needlessly harmful. For instance, an "entropy debt" can be built up through maintenance of an out-dated structure and then realised all at once when that structure is abandoned (Foster, 2011a). van Griethuysen (2002) also makes the argument that the relationship of the economy to the wider environment is inherently dialectical, with economic structure being fashioned out of the environment and therefore having an effect on it that may often be harmful. For development policy, these observations suggest that there needs to be an explicit shift away from a "development at all costs" attitude to one where we acknowledge the inherent environmental impact of the economic process.

Specifically, development policy must aim to put in place structures which prevent overuse of resources which creates unnecessary entropy. Social rules and norms such as found in Ostrom & Basurto (2011) can play a big part here, particularly in nations where the government is weak. Also, pricing waste so that it enters costs of producers is a tried and tested method by which we can avoid overuse of resources (Foster, 2011a). As well as trying to prevent excess entropy creation, developing nations need to be aware of the necessary entropic waste produced by the economic process, and put in place institutions which can act as "entropy sinks" such as recycling or designated dump sites.

Conclusion

In all the above discussion, what we have tried to argue is not that orthodox development theory based on neoclassical growth economics should not be entirely discounted. However, we see ever more concerns about the imbalances of such an approach and throughout this essay we have seen how neoclassical based theory must rely on rather ad hoc methods to gain insight into development policy. By contrast, evolutionary growth theory allows us to explicitly account for key features of the economy like a diversified innovation system, institutions governing economic interaction and the environmental consequences of growth. It provides us with a more sophisticated framework for theory as well as more nuanced and grounded policy prescriptions. To continue lifting billions out of poverty while managing to do so in a sustained and sustainable manner, we should increasingly look to evolutionary economic theory.

Reference list available upon request to the UQES.