

**EC316 Summary (2):**

**Topics in Macroeconomics With Time Series Econometrics**

**Lewis Britton {201724452}**

EC316: Topics in Macroeconomics With Time Series Econometrics

Academic Year 2019/2020

Word Count: {N/A}

**EC316 Supplementary Notes**

**Lecture 9: The Euro**

* Adopting a common currency – fixes ERs
* Giving up Flexible ERs:
  + Giving up ability to adjust both *i* and ER

**1: ER Volatility Concern**

1. Degree of Openness
   * European economies are very open
   * Int. trade important for domestic *Y*
   * High reliability of X and IM
   * Demand/*Y* is more exposed to fluctuations in ER
2. Wide ER Fluctuations
   * **Real Depreciation** can improve trade balance (X – IM)
   * Higher inflation and collapse of free trade
   * Require more coordinated institutions and common monetary system
3. Common Agricultural Market
   * Common Agricultural Policy (CAP)
   * Single ECU (weighted avg. prices in different currencies) price for agricultural products
   * Devaluation of one currency meant relative price change cross-country – exposes prices again to fluctuations in ER

***1.1: Fixing Currency – Bretton Woods Agreement***

* Keep volatility in check
* Currencies follow the US$
* Deviations kept {+/- 0.75%}
* *1970s Collapse – Incompatibility between German and US policy goals*
* **US Monetary Expansion** to fund Vietnam War – inflation
* High inflation in US, lose competitiveness due to high prices (IM > X)
* **Germany Monetary Contraction** raised *i* to make German bonds and currency more attractive than US
* *Fed didn’t change i so policy option was to devalue*
* *Europeans clashed with ineffectiveness of ER policy – inf. UK & Italy: 20%, Fra. 15%*

***1.2: Monetary System Fluctuation Options***

1. Raise *i*
2. Ask for realignment

* Slide 13 for Formulae Example
* In EMS: in highest margins – raise *i* or change central parity of devaluation band
* *Higher i rates make currency more attractive*

**2: Forming Monetary Union**

* Maastricht Treaty – February 1992
  + Single currency decision
  + Convergence of countries aspiring to join – inflation, ER, L-R *i*, pub. def.
  + Creation of ECB
* Single Currency impossible for countries to devalue
* European Council 1998 agrees on members which met criteria

***2.1: EMU Admission Criteria***

* **Inflation Rate** 
  + Previous yr. can’t be > 1.5pp above that of three best performers
* **Previous Deficits & Debts**
  + Ratio of Gov. Def. to GDP can’t be > 3%
  + Ration of Gov. Debt to GDP can’t be > 60%
* **ER**
  + For at least 2 years, fluctuations within band
* **L-Term *i***
  + One year prior to examination, avg. l-term rate can’t exceed more than 2pp of the three best performers (using l-term gov. bonds)

***2.2: Europe – Optimal Currency Area (OCA)?***

* *“To what extent are European economies likely to face* ***Asymmetric Shocks****?”*
* Two Conditions for OCA
  1. Countries face similar shocks
  2. High labour mobility

1. Can the Euro make business cycles more synchronised?
   * Trade intensity
   * Industry specialisation
   * Labour mobility across countries

* *Some studies find sync. among countries but not all – labour mobility historically low – still possibility of* ***asymmetric shock*** *– req. different stabilisation processes*

**Lecture 10.1: Univariate Root Testes Cont. (Econometrics)**

**1: Alternative AR(1) Characterisations**

***1.1: Stationary Processes***

* Where
  + - is stationary process
    - 0 Mean
    - Constant Variance
    - is stationary process w/ **drift**,
    - Constant Mean
    - Constant Variance
    - is **trend** stationery process and will be stationary w/
    - ConstantMean **(**if Detrended - )
    - ConstantVariance **(**if Detrended )

***1.2: Non-Stationary Processes***

* Where
  + - follows a random walk
    - has 0 Mean & Constant Variance
    - follows a random walk w/ **drift**
    - has Mean and Variance
    - follows a random walk w/ **trend** then **drift**
    - has Mean and Variance (if Detrended )

**2: Testing for Unit Roots**

* **Dickie Fuller**: has Unit-Root if
  + **Testing Regression**:
  + **Null Hypothesis**: H0:
    - Null Hypothesis: H0: {As }
  + **Test Statistic**: as t-ratio on called on non-std. distribution of test-stat
  + **Decision** **Rule** (p-value):
    - Stationary: {< 0.05} Reject H0
    - Non-Stationary: {> 0.05} Fail-To-Reject H0
* **Augmented Dickie Fuller**: Adding further lagged terms and trend to test
  + **Testing Regression**:
  + **Null Hypothesis**: H0: H0:
  + **Test Statistic**: as t-ratio on called on non-std. distribution of test-stat
  + **Decision Rule**:
    - Stationary: {< 0.05} Reject H0
      * *“* Stationary about trend if *”*
    - Non-Stationary: {> 0.05} Fail-To-Reject H0
      * *“* Non-Stationary about trend if *”*
* **Example(s)**:

A close up of a sign

Description automatically generated

* + **Decision**: p-value on -test is {> 0.05} Fail-To-Reject H0 l\_GDP Non-St. & Unit-Root

A screenshot of a computer

Description automatically generated

* + Decision: p-value on -test is {< 0.05} Reject H0 d\_l\_GDP Non-St. & Unit-Root

**Lecture 10.2: Garch Models of Volatility (Econometrics)**

* Where is more important than the variables themselves
  + E.g. risk in share price
  + E.g. derivatives (options etc. derived from assets)
  + E.g. – how it looks:

A close up of a logo

Description automatically generated

* Volatility Clustering:
  + Riskiness isn’t randomly scattered across data, some periods more risky
  + Periods of high volatility followed by periods of tranquillity – **autocorr.**

**1: Stock Prices & Returns**

* + *“Stock prices* ***rise*** *by average of ea. period, but are unpredictable”*
* Rearrange:
  + *“Stock prices* ***are*** *on average, but are unpredictable”*
* **Example**:

A close up of a logo

Description automatically generated

A screen shot of a social media post

Description automatically generatedA close up of a person

Description automatically generated

**2: Stock Price Volatility**

* + *Difference in stock price, deviations from mean, square them*

***2.1: AR(1) Model of Volatility***

* Vol. depends on vol. in previous period
* Usually : if high vol. last period, there will likely be again, same /w low
  + “**Volatility Clustering**”
  + Error means there can be exceptions
  + Provided R’s are stationary: OLS estimates, t-stats, p-values can be interpreted the standard way

**3: Autoregressive Conditional Heteroscedasticity (ARCH) Models**

* Financial time-series
* Involves equations for and
* GARCH Model:
  + Adds lags of instead of just squared terms
* ARCH vs. GARCH
  + A screenshot of a social media post

    Description automatically generated

**4: Conclusion**

* Many t-series variables, such as asset prices, seem to exhibit random walk behaviour – hard to predict future movement
* However, volatility is more accurately predictable – used as dependant variable

**Lecture 11: The Great Recession**

* How does macroeconomic theory explain 2007-2010 crisis?
* House problem to financial crisis financial to macroecon. policy recovery

**1: Housing Problem to Financial Crisis**

* **Economic** **Bubble**: prices of assets > their fundamental value
  + Once they burst, asset prices collapse
* **Sub-Prime**: intended for borrowers w/ low probability of repayment
  + Amplification led to system collapse

A close up of a map

Description automatically generated

***1.1: The Bubble***

* Rapid house price demand post-2000
  + Long period low *i* – incentive to borrow to buy (expanded financial sector)
  + No need to raise *i* as π was low (house price change doesn’t enter π)
  + Expectation of house prices continuing to rise (irrational exuberance)
    - People think it’s an easy way to make money
  + Borrowing easier as banks made mortgage approvals less strict
  + Low probability repayment households were approved (sub-prime)
  + Banks didn’t care about this risk as they repackaged the mortgages and sold them as ranks of Mortgage Backed Securities

***1.2: Initial Trigger***

* Summer 2007
  + Started in the sub-prime mortgage market
  + House prices stopped increasing and people increasingly defaulted
  + Underlying properties are foreclosed and transferred to banks
    - Current value of house < initial loan

***1.3: Bubble Popped into Financial Crisis***

* Banks are intermediaries between borrowers and lenders
* **Solvency Problem**: if asset value < liabilities: bank becomes insolvent
* **Liquidity Problem**: banks now cant repay their lenders
* **Leverage** plays a part in amplifying this – everything is blown up
  + Leverage Ratio = {Assets/Capital}
  + Capital Ratio = {Capital/Assets}
  + Incentive existed due to (1) underestimated risk, (2) high bonus incentive
  + There was a regulation on min{Capital Ratio} – new ways to avoid
* **Complexity**:
  + Movement away from balance sheet operations
* **Securitization**:
  + *Creation of securities based on bundling assets (e.g. mortgages)*
  + **Mortgage Backed Security**: a title to returns from bundle of mortgages
    - Bundled assets shouldn’t be correlated but sub-prime’s were, high
  + **Collateralised Debt Obligations**: high risk, high return assets on default
* **Structured Investment Vehicles (SIVs)**:
  + Off balance sheet operations independent from banks
  + **Liability** side: borrows from investors (short-term debt)
  + **Asset** side: holds various forms of securities
  + *Asset relies on bank as lender of last resort*
* Shadow Banking & American International Group\*\*
* House Prices Decreased
  + Assets became **Toxic Assets** very high risk and no one wanted to hold
  + Fire Sales
  + Assets attached to the mortgages declined in value also

**2: Financial Problem to Macroeconomic Problem**

**3: Policy Response**

**4: Slow Recovery**

**Lecture 12: High Debt**

*“Why do economists worry when governments accumulate debt quickly?”*

1. Budget Constraint of Government
2. Analysing Debt-to-GDP Ratio
3. Political Theory of Debt

* **Primary Deficit**: (G – T) *“gov. spending (-) taxes (collected)”*
  + G (can be) > T: with borrowing
* **Cyclically Adjusted Deficit**: what the deficit would be if Y was at natural level
* **Inflation-Adjusted Deficit**: deficit measured in real terms (adjusted for π)

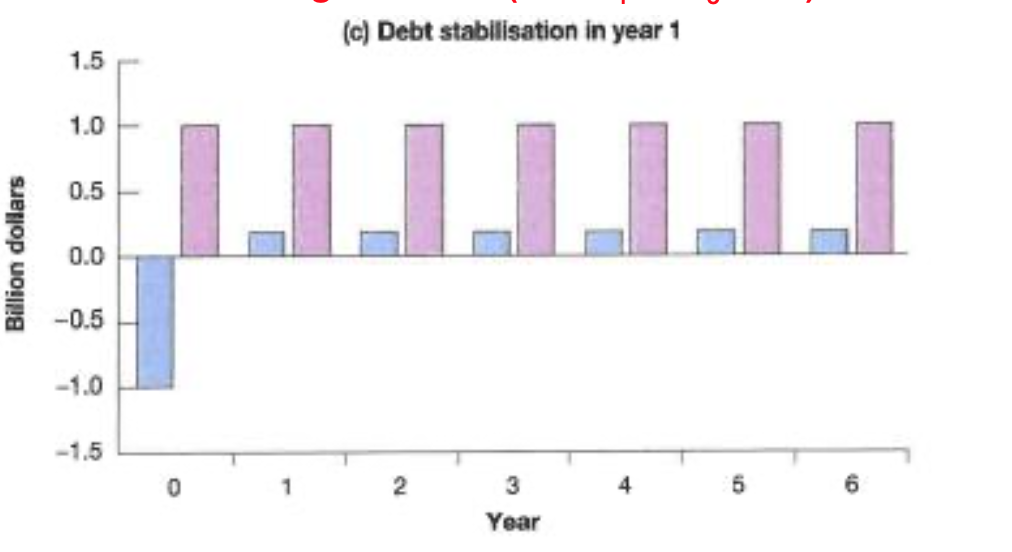
**1: Government Budget Constraint**

* Create a budget deficit to stimulate economy, people to spend
* How can you repay this?
* Assume **Deficit Financing** (sell *B* to investors; as opposed to T > G):
* Hence Budget Constraint:

***1.1: Repaying Debt***

* A screenshot of a cell phone

  Description automatically generated**Case 1** **Example**:
  + *Repays in year 1 so* {B0 = 1; B1 = 0}
  + Hence (sub to above):
  + Gov. creates **Primary Surplus** in year 1 (=) (1+*r*)
  + An increase in T of initial T cut plus *i* rate on debt
* A drawing of a person

  Description automatically generated**Case 2 Example**:
  + *Repay after t years so no payment previously*
  + Hence:
  + Gov. creates **Primary Surplus** (=) (1+*r*)*t*
  + \\ If G unchanged, reduction of T today must be offset by increase in T*t*
  + \\ Delaying T increase or higher *i* means T increase must be **larger**
* **Case 3 Example**:
  + *Stabilise at a higher level* {B0 = B1 = 1}
  + Government doesn’t need to repay
  + Hence:
  + To stabilise debt, gov must achieve **Primary Surplus** (=) real interest rate and this must hold for every subsequent year

**2: Analysing Debt-to-GDP Ratio**

* Normalise above by the real output Y
* *“Change in debt ratio is (=) to sum of”:*
  + Difference between real interest and rate of GDP, multiplied by end-of-period debt ratio
  + The ratio of **Primary Deficit** to GDP
* First Equation: debt level evolves with real interest
* Second Equation: debt-to-GDP ratio evolves with real interest and growth

***2.1: What Will Happen to Debt-GDP in L-R?***

* Effected by {Deficit/Debt Position A/Interest Rate *r*/Growth Rate *g*}
* Treating in year *t* as **Exogenous** (a given)
* Hence:
* Parameter
* Is Debt-GDP **sustainable** or **unstable** (keeps growing)?
  + Is it converging or diverging to 45º line

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Primary Deficit**  (Gt – Tt > 0) | Figure (a) | Figure (c) |
| Primary Deficit  (Gt – Tt < 0) | Figure (b) | Figure (d) |

A close up of a map

Description automatically generated

A close up of a map

Description automatically generated

A close up of a map

Description automatically generatedA close up of a map

Description automatically generated

* (a) & (b): if (*g* < *r*), with (+) Debt and Primary Deficits, debt ratio increases
  + **Diverge** from Equilibrium
  + Prevent exponential increase in debt ratio: run **Primary Surplus**: (G < T)
* (c) & (d): if (*g* > *r*), debt-GDP ratio will **Converge** to steady state in L-R
  + Even with **Primary Deficits**, convergence occurs
  + Governments don’t need to stabilise debt-to-GDP ratio

**3: Political Theory of Debt**

* 1960’s: strong growth w/ average growth exceeding *r* almost everywhere (*g* > *r*)
  + Falling debt ratios w/o needing surpluses
* 1970’s: lower growth and lower interest rates
* 1980’s: growth rates slowed, interest increased
  + To avoid increase in Debt-GDP, countries should have created large surpluses
  + However, period leading to 2007 saw sharp increase in Debt-GDP ratios

***3.1: Dangers of Very High Public Debt***

*Usually around 200%*

1. Increase **Primary Surplus**, government raises taxes but they’re unpopular
2. Political uncertainty increases increases risk premium increases interest rate
3. Fiscal tightening induced by first increase in *r* then generates deeper recession reduces rate of growth
4. Increase in *r* and lower *g* result in higher (*r* – *g*) more difficult to stabilise debt-GDP ratio

***3.2: Return from High Debt***

* If debt-GDP is very high, can escalate and lead to debt crisis
  + Impossible to issue new debt, except at extraordinary rates
* Wait rather than immediately introducing adequate measures as:
  + Debt crises unpredictable, short-sighted gov.’s reluctant to admit crisis
  + Fiscal policy/correction would impact differently on societal groups

***3.3: Reduce High Debt***

*Where (r > g), three way to achieve reduction:*

1. Generate **Primary Surpluses**
2. **Monetary Financing by CB**: Print money by purchasing gov. bonds
   * Raises inflation, like a form of taxation – reduces real value of debt and cash
3. **Repudiate the Debt** 
   1. Pros: reduces distortions of high debt
   2. Cons: erodes trust between investors and government – gov.’s perhaps unable to run deficits in case of unexpected high expenditure

***3.4: Political Theory of Debt***

* Reduce Debt Redistribute Wealth (debt reduction, raised tax, higher inflation)
  + Rentiers: earn from securities
  + Entrepreneurs: earning from owning physical capital
  + Workers: earning from owning human capital

**Lecture 13 & 14: Time Series Correlation, Cointegration & Error Correlations**

1. ADL Model
2. T-Series Regression w/ X & Y Stationary
3. T-Series Regression w/ X & Y Non-Stationary (Unit-Roots)
   * Spurious regression
   * Cointegration
   * Estimation/Testing w/ Cointegrated Variables
   * T-Series Regression w/ X & Y Cointegrated (Error Correction Model)

**1: Recall Stationarity & Non-Stationarity**

* **Stationarity**: Constant Mean, Constant Variance, No Seasonality
* is Stationary (does not have a Unit-Root) if:
  + is (=) @ all *t* values
  + is (=) @ all *t* values
  + depends only on *s*, not on *t*
* is Non-Stationary (has a Unit-Root) if:

**2: Autoregressive Distributed Lag**

* is dependent upon:
  + lags of
  + lags of
* *Y & X must hold the same stationarity properties (both stationary or non-’)*

**3: Testing ADL for Non-Stationarity**

* Stationary OLS Regression t-test F-test
* Rewrite for change in :
* **Long-Run Multiplier**: Y & X are in equilibrium X increases by 1 in perpetuity Y changes accordingly L-RM (=) difference between equilibrium Y and this effect of X on Y

***3.1: Spurious Regression w/ Non-Stationarity***

* Recall (**Example**):
  + t-tests will show values which indicate when it may be (recall)
  + This is called “Spurious Regression”

***3.2: Cointegration w/ Non-Stationarity***

* Cointegration: in **equilibrium**, errors **stationary**, no **Unit-Root**,
* No Cointegration: no **equilibrium**, errors **non-stationary**, **Unit-Root**
  + **\*\*** Cointegration if: Unit-Root in Variables No Unit-Root in \*\*
  + Error Estimation:
  + Equilibrium stays small
  + The gap between each line of and is relatively **constant**
    - https://www.youtube.com/watch?v=q5wbOSjbVW4
* If both of these have Unit-Roots, also is expected to have a Unit-Root
  + If holds Unit-Root: Spurious Regression
  + Possible that Unit-Roots of and “cancel ea. other out”
  + *“If and have Unit-Roots but a linear combination of them is Stationary,*  *and*  *are Cointegrated”*

***3.3: Regression w/ Cointegration***

* Cointegration of and : no Spurious Regression
* Regression of and : ‘cointegrated regression’
* Regression coefficient: Long-Run Multiplier
* *Engle-Granger Test, Johansen Test*

***3.3.1: Regression w/ Cointegration in Gretl***

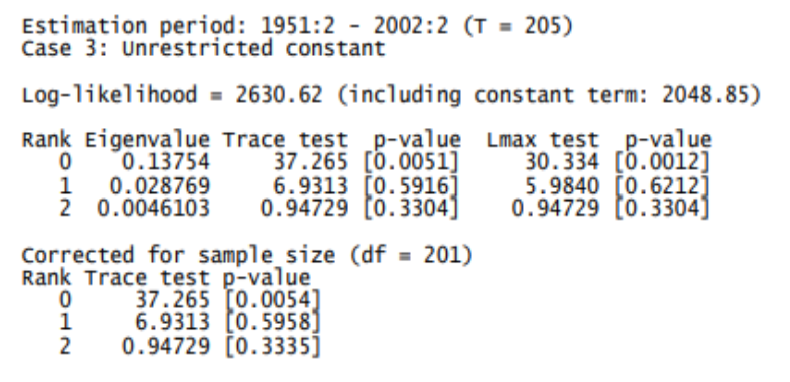
* Same as Unit-Root but:
  + H0: “**Unit-Root** exists, **non-stationary**, **no** **cointegration** between ”
  + HA: “**No Unit-Root** exists, **stationary**, **cointegration** between ”

**4: Issues w/ Cointegration Testing (Engel-Granger Test)**

* Previously focused only on and but we can use up to variables
* The Engel-Granger Test would only find whether there is Cointegration or not – not how many Cointegrating relationships there are
* Therefore, (1) use the Johansen Test which is VAR-based, (2) do multiple Engel-Granger Tests for combinations of ln values (e.g. ln(Y) & ln(C), ln(C) & ln(I))

***4.1: Example – Cointegration Between C, I, Y***

* If ln(Y), ln(C), ln(I) contain Unit-Roots, possible **two** Cointegrating relationships
* **Johansen Test**:

****

* + HRank 0: Null that there is 0 Cointegrating relationships
  + HRank 1: Null that there is 1 Cointegrating relationships
  + HRank 2: Null that there is 2 Cointegrating relationships
  + If | Critical Value | < | trace-stat |: Reject Null Hypothesis
  + If p-value < 0.05: Reject Null Hypothesis
  + *This Example:*
    - Reject HRank 0
    - Fail to Reject HRank 1
    - Fail to Reject HRank 2
* **Engel-Granger Test (Form of DF Test)**:
  + Step 1: test for Unit-Root in C (Model of Y & C)
  + Step 2: test for Unit-Root in Y(Model of Y & C)
  + Step 3: Cointegration Regression
  + Step 4: test for Unit-Root in Error
  + *Cointegrated if: Unit-Root in Y & C, no Unit-Root in*

**5: Error Correction Model (ECM)**

* *Moving forward, assuming variables are Cointegrated*
* If and are Cointegrated, their relationship can be shown as ECM
* Error from and regression:
* ECM Error:
* EMC has: :
  + If we knew , ECM would be similar to ADL
  + ECM says depends on, also same idea as ADL
  + New: depends on (equilibrium error)
  + New: (for now) assume to observe

***5.1: ECM Intuition***

* If : is **too high** to be in equilibrium
* As: thus so too
* *“If is above equilibrium, it will start falling in the next period so the equilibrium error will be ‘corrected’”*
* If : **Opposite of Above** (If , errors magnified rather than corrected)

***5.2: ECM Testing***

* Don’t worry about Spurious Regression
* Assumed and have Unit-Roots
* Assumed and are Cointegrated, thus is Stationary
* Assumed and are Stationary
* Hence, dependent and all explanatories are Stationary
* Thus, OLS regressions and t-tests etc. work as standard
* New issue: is explanatory, errors not directly observed, replace w/ residuals
* **Two-Step Estimation**:
  + Step 1: Run regression of and and save residuals (uhat)
  + Step 2: Run regression of on intercept and w/ residuals from Step 1, lagged by one period
* Same ‘correction of equilibrium error’ interpretation
* A screenshot of a cell phone

  Description automatically generated**Example**:

* + Error coefficient says “equilibrium error of 1cent causes *Y* to fall by 1.085cents in the next period, all else remaining constant”

**6: Summary**

* We can now model under **three** circumstances
  + When all variables are Stationary
  + When all variables have Uni-Roots and are Cointegrated
  + When all variables have Unit-Roots and are not Cointegrated

**Lecture 15: Policy & Policy Makers**

* *“Given uncertainty about policy, would we be better w/o it?”*
* *“Can we trust policymakers to use correct policy?”*
* Policy Uncertainty Policy Expectations Policy Politics

**1: Policy Uncertainty**

* **Example**: CB want decreased Unemployment w/ Monetary Expansion
  + ME is increase in M lower *i*  higher *I*  higher demand lower
  1. Is unemployment at the natural level?
  2. How much will *i* change?
  3. How will stock prices change? (lower *i* lower disc. rate higher PV)
  4. How will ER change? (How will this effect (X – IM))
* Uncertainty can be modelled
* Economic agents financial markets firms and households
* *“Normal g of GDP, G is reduced by 1%, expected consequences on GDP”*
  + The Area-Wide Model of European CB
  + MULTIMOD Mark II
  + NiGEM
  + The Quest Model of the European Commission
* **Example**:
  + Brexit inflation modelling will produce a range of outcomes with varying likelihoods due to uncertainty
* Should uncertainty mean Policy Makers do less?
  + **Yes**, policy should be aimed at avoiding prolonged recessions slow booms and avoid inflation pressure
  + Higher , or higher , more active policies should be
  + Should stop well short of trying to achieve constant or

**2: Policy Expectations**

* What people do: depends on expectations of policy
* What policy makers do: depends on the state of the economy

***2.1: Inflation Unemployment Trade-Off***

* Recall:
  + (1) CB state policy (2) W-Setters & HHs negotiate wages (3) CB acts
  + *CB sets target wage setters and households negotiate W CB implements these in order to achieve taget*
  + Increase in over natural: lower
  + Decrease in under natural: higher
* Suppose 0-inflation Mon. Pol.
  + To achieve 0-inflation,
  + **Time Inconsistency**: incentive to deviate from announced policy once other player has made a move (W-Setters in this case)
  + **Example:** 
    - If: , accept 1% , CB can achieve of 1% below natural
    - In response: W-Setters expect economy returns to w/ higher

***2.2: Credibility***

* *CBs will therefore need to be seen as* ***Credible*** *when staying in-line w/ policy*
  + *Commit not to do something that seems desirable to them in the short-run*
  + *Will have bad effects for both parties in the long-run (like Prisoners D.)*

1. Make CB independent
   * Less likely to deviate to achieve s-term goals (e.g. if ties to political party – may deviate pre-election)
2. Encourage CBs to view l-term inflation
   * Reduce incentive for s-term goals (e.g. give CBs l-term in the office)
3. Choose Inflation-Averse CB
   * If inflation is not liked, unlikely to want low unemployment through high inflation

**3: Policy Politics**

* CB/political goals may not align w/ economic/societal goals
* Short-Sighted Voters: don’t care for L-R economy (want politicians to cut taxes)
* **Conservatives**: stimulate the L-Term economy

**Lecture 16: Monetary Policy Rules**

* Should CB change *i*? Long-Run objectives of CB
* E.g. the Federal Reserve’s response to Coronavirus {*i* = ~0}
* *What is optimal target for π?*
* **Recall** (Short-Run):
  + Increase on M supply leads to decreased *i* and increased demand/output
* (Medium-Run):
  + Change in M has a neutral effect
  + No effect on growth of economy or unemployment
  + Money change leads to proportional price increases
  + Changes in money growth lead to corr. changes in π

**1: Optimal Inflation Rate**

* *Most wealthy countries have had low inflation for the last few decades*
* *Very high inflation can disrupt economic activity*
* Target: ~0%-3% p.a. (not too costly)
* Costs: Trade-off between inflation and low unemployment/high output

1. Show Leather Costs
2. Tax Distortions
3. Money Illusion
4. Inflation Variability

***1.1: Shoe Leather Costs***

* Increased opportunity cost of holding money: higher costs due to going to the bank more often w/ high inflation (could be working instead etc.)

***1.2: Tax Distortions***

* Tax on capital gains: higher inflation, higher tax (volumetrically)
* **Effective Tax Rate**: ratio of {tax paid-to-price sold}
  + Buy house £50,000; sell house £50,000(1+π)T
  + Real value of house unchanged as money will buy you same amount
  + Pay greater tax, but shouldn’t pay tax as sold at same relative price
  + cap gains tax = 30% {cap. gain = 0}, effective tax rate:
* Tax Distortions: tax doesn’t increase w/ π (e.g. move to higher income brackets)
  + Same **real** income, different **nominal** income

***1.3: Money Illusion***

* People make mistakes when assessing **real** vs. **nominal** changes
* E.g. comparing income across time means you need to account for π
* E.g. choosing assets or consuming/saving

***1.4: Inflation Variability***

* Higher π usually means more variable π
* E.g. buying a bond w/ longer maturity is far riskier w/ higher inflation

**2: Benefits of Inflation**

1. Seignorage
2. Option of Negative Real *i*
3. Money Illusion Revisited

***2.1: Seignorage***

* Money creation: alternative to borrowing form public or raising tax
  + High π trade-off
  + Works well in countries w/ high π

***2.2: Negative Real Interest Rates***

* Recall:
* *Economy w/ higher π has more scope to use Monetary Policy to fight recession*
* **Example**:
  + If : chance that is (-)
    - Investors gain from borrowing
    - Higher investment and higher demand

***2.3: Money Illusion Revised***

* Workers should be indifferent between:
  + Both give 2% decrease in Real Wage however the first case is more likely to be accepted – people happier w/ higher wage and inflation

***2.4: Optimal Inflation Rate?***

* Some want price stability (zero-inflation)
  + Eliminates Money Illusion and eases decisions
* Others want to keep small inflation
  + E.g. 3% is desirable compared to 1%
  + Costs of 3% are outweighed by benefits compared to 0%
  + **Indexing Tax**: taxes change w/ inflation – prevents some costs

**3: Monetary Policy Rules**

* Money growth rate
  + Until 90’s CBs chose nominal money growth for M-R economy
* Inflation targeting
  + Today, (low) Inflation Targeting is used for M-R – require S-R *i* changes

***3.1: Money Growth Rate (1990’s)***

* CB chose target nominal M growth corresponding to desired π for M-R
* In S-R, CB allowed for deviations of nominal M growth from target
  + E.g. recession: increase nominal M growth faster decrease in *i*
* CB announce range of nominal M growth which allowed to follow M-R desired π and S-R deviations like above
* *Stopped using this rule over time*
  + Money growth didn’t drive π as exp. – more difficult to target M-R π
* S-R: M growth determines output
* M-R: M growth determines π
* *Not a tight relationship due to the shift in money demand*
* **Example**:
  + Monzo introduced – people prefer this to holding money reduction in real money demand
  + In M-R: also needs to be corresponding reduction in real M stock
  + For money stock (growth) to remain same, must be price increase so (+) π
  + Relationship between money and π breaks down
  + Therefore, abandon Money Growth Rate, adopt Inflation Targeting

***3.2: Inflation Targeting (1990’s )***

* Recall Phillips Curve:
  + *Inflation Targeting leads to CB eliminating deviations from natural level* 
    - *Not likely to happen in practice*
    - CBs can’t always achieve desired S-R π
    - Phillips Curve doesn’t always hold
    - *Inflation Targeting is strong in the M-R and allows Mon. Pol. to stabilise Y around S-R natural*

***3.2.1: The Taylor Rule***

* *“CB should choose i rather than state of M growth”*
  + Once CB chooses target π, try to achieve through adjusting *i*
  + show relative importance
  + If : CB gets
  + If : CB should increase
  + If : CB should decrease

**Lecture 17: Fiscal Policy Rules**

* Changes in Government Budget Constraint (G – T)
  + Primary Surplus or Primary Deficit
* **Short-Term**: how to use fiscal policy to finance gov. expenditure
* **Long-Term**: how to manage gov. debt and distribute tax burden
  + Aging populations: imbalances between how much a gov. needs to spend at the top of the distribution vs. how much they raise in tax from lower
* Fiscal Issues
  + Ricardian Equivalence
  + Deficits, output stabilisation, cyclically adjusted deficit
  + Wars and deficits
* Fiscal Restraints
  + Fiscal rules
  + Fiscal rules for countries within monetary union

**1: Ricardian Equivalence**

* *“Neither deficits nor debts have any effect on economic activity”*
  + E.g. gov. uses debt financing (deficit spending), effects will be neutral
* Government raises government spending
  + Extra can be financed by rising T or raising public debt
  + Does financing method matter in economic activity?
* Optimistic View
  + Perfectly foresighted consumers – rational view of future, expectations taken into account when decision making in the present
  + How we finance extra spending should have **no** effect on behaviour
  + E.g. people won’t change C in response to a tax cut as they will expect future tax increase so expected labour income will remain same
  + *Assumes*: consumers understand gov. budget constraint
  + *Assumes*: expect primary surpluses to follow primary deficits
* PV of Tax Liabilities
  + Suggests timing of taxes doesn’t matter
  + What matters is PV of tax liabilities
  + **Example**: gov. announces 0-tax income in the S-R, you know they can afford this L-R is increase in future income tax
    - Year 1: higher (Y-T); Year 2: lower; Year 3: lower…
    - Savings increase with current higher YD – save for lower Y periods
    - **Overall**: no change
* Evidence shows this holds reasonably but not enough to ignore debts/deficits
  + Tax cuts known, future taxes uncertain
  + People not infinitely lived, or don’t optimise over all *t* periods
  + Not all households are the same

**2: Output Stabilisation**

* Deficits during recessions should be offset by surpluses during booms
  + Times are bad: run deficits
  + Times are good: run surpluses
  + Full employment deficits: deficit which would exist under natural Y
    - OECD Mid-Cycle deficit or cyclically adjusted deficit
* Cyclically Adjusted Deficit
  + S-R fluctuations may be driven by debt financing
  + Once Y returned to Yn, and still deficit; L-R debt accumulation
  + If {CAD = 0}: debt stabilises
* Fiscal goal not necessarily to have {CAD = 0} always
  + In recession, gov. may want large deficit enough that {CAD > 0}
  + Since debt will accumulate, expect policy change over *t* (tax increase)
* CAD theory simple but difficult in practice
  + Hard to establish how much lower deficit would be if output was higher
    - E.g. Y drops by 1% in recession, increase in deficit of 0.5% of Y
    - If Y 5% < Yn: deficit-to-Y level 2.5% higher than it would be at Yn
    - **Automatic** **Stabiliser**: when Y drops, deficit increases to stabilise
  + Difficult to assess how far output is from Yn
    - Also hard to assess un
    - If un is too low, too high an estimate of Yn
    - Therefore, CAD will be too optimistic

**3: Wars & Deficits**

* Consumers and firms are effected differently depending on war funding method
* Using deficits is the most common method in war
  + **Distribution**: debt burden of war is passed to future generations
  + **Tax Distortions**: deficit spending helps reduces tax distortions

***3.1: Distribution***

* Assume Y is fixed at Yn
* In wars G increases (military equipment, infrastructure, healthcare etc.)
* So **debt** finance or **taxation** finance?
* **Deficit Finance**
  + Sharp ↑ G increases demand for goods
  + *i* must ↑ so I ↓
* **Taxation Finance**
  + ↑ T, significant ↓ C
  + By how much depends on consumers’ expectations (e.g. longer the war lasts, longer they’ll get higher taxes, more likely ↓ C)
  + ↑ in G will be partly offset by ↓ in C
  + Therefore, ↑ in *i* and I ↓ will be smaller
* *Lower I means lower K so, post-war, lower Y*
* *By ↓ K accumulation, deficits can be passed to future generations*

***3.2: Tax Distortions***

* G is exceptionally high (e.g. reconstruction post-earthquake)
* T must ↑ drastically
* Distortions: people work less or engage in tax avoidance
* Tax Smoothing: during crises deficits must be very large but, taxes used to compensate for this in future should be reasonably small and spread

**4: Politics & Fiscal Restraints**

* Politics can lead to L-Term deficits – can rules limit the negatives?
* The USA:
  1. Constitutional budget balance amendment
  2. Impossible to conduct fiscal policy
* The UK
  1. The Golden Rule: gov. will only borrow to invest and not to fund G
  2. Sustainable investment rule: public debt kept at sustainable level
* Why systematically run public deficits?
  + ↑ C before elections in order to increase probability of re-election
  + Gov.’s tend to spend above means and pass burden to future
  + Population ageing in advanced countries so high spending on pensions etc. are not relative to T claimed from working age
* Monetary Union increases importance of fiscal discipline
  1. Correct incentive to pass costs of fiscal expansion
  2. Prevent crisis in one country spreading to all members