

Advanced development economics: Applied macroeconomic and policy analysis

January 2017

MARKING GUIDELINES

Introductory comments

To evaluate the essays it is vital to recognize that students are likely to structure their answers quite differently (especially to questions 1 and 2). In doing so, they are also likely to make different substantive points. So, the content of essays will vary. This is perfectly acceptable – i.e., good answers, even top grades, will not all look the same.

As a result of the above, rather than provide “a” single model answer, the following marking guidelines seek to:

- (a) broadly describe the profile associated with different grades; and
- (b) identify key points (plus associated evidence, examples, and references), based on the curriculum, that candidates might be expected to cover. Note that the key points are not comprehensive, but it would be difficult to achieve a top grade without covering a reasonable number of them in some way.

In addition, it is important to highlight that one of the main overall learning objectives of the course was to foster critical thinking among the students – i.e., to be able to think for themselves and to recognize strengths and weaknesses of alternative approaches to economic analysis. As a result, answers that demonstrate these capacities should be evaluated more positively.

General profile of passing grades (informal description)

Grade	Description
2	Shows basic knowledge of the curriculum. Able to communicate at least one key point, with supporting evidence. Structure of the essay may be weak and / or somewhat unclear. Major gaps or misunderstandings may be present.
4	Shows reasonable knowledge of the curriculum and adequately covers one or more key points. However, important gaps in terms of coverage or misunderstanding of evidence or ideas may be found. Candidate is able to communicate and structure ideas with reasonable clarity. Some aspects of the questions may be given inadequate treatment.
7	Shows reasonable knowledge of the curriculum and adequately covers more than one key point. Ideas are communicated in a structured fashion and relevant evidence is used as appropriate. Some gaps in terms of use of evidence or coverage of key ideas may be identified. All aspects of the question are addressed.
10	Shows good knowledge of the curriculum and covers various key points in depth. Ideas are well structured and relevant evidence is used consistently and appropriately. Few gaps in terms of evidence or coverage are found. Adequate references are provided. All aspects of the question are addressed.
12	Excellent in all regards, reflecting a high academic standard. Essay is thoughtful (shows critical thinking), is clear and well structured, and comprehensively covers many key points / issues. A full set of references is provided.

Question 1: “Propose a set of practical criteria to evaluate the quality of official macroeconomic statistics provided by national statistics agencies in developing countries. Provide examples of failures to meet these criteria”

General comments

Concerns around the quality of macroeconomic statistics are relevant from both a practical (policy) and research point of view. This issue has been recognised by the IMF and has often come in to focus following economic crises (in emerging markets), where a lack of timely, relevant and accurate information was found to have impeded the early diagnosis and resolution of problems (e.g., Tequila crisis in Mexico, discussed in Boughton, 2012). From a research perspective, data quality concerns frequently focus less on timeliness but more on (spatial) comparability and the comprehensiveness of cross-country datasets. This is illustrated in the debates around the Penn World Tables (see Jerven, 2013; Johnson et al., 2013).

Key points

- It may be helpful to note that different users are likely to have different data quality requirements or priorities. As a result, it is not possible to provide either a unique list or ranking of different (practical) criteria that will be valid in all situations and for all users.
- A useful starting point for *practical* evaluation is the IMF’s ‘Data Quality Assessment Framework’ (DQAF), which is intended to provide a structure for assessing existing practices against best practices, including internationally accepted methodologies.
- The table below draws on the DQAF and other sources (e.g., lecture notes / readings) to set out a number of the most important and desirable features of official macroeconomic statistics systems. These criteria are complemented by examples of ‘failures’ – i.e., areas where countries have often failed to meet reasonable standards.
- Macroeconomic statistics are (almost always) estimates. Quality concerns/challenges translate into uncertainties around these point estimates. While we cannot realistically expect statistics to be perfectly accurate, greater recognition of the magnitude of uncertainty can be helpful, especially for policy-makers and the public (e.g., in order to avoid over-confidence).

Criteria	Description	Example(s) of failure
Adequate enabling conditions	The production of official statistics requires a suitable legal framework (i.e., to establish responsibilities and authorities) as well as sufficient financial and human resources.	A critique of fiscal austerity imposed under structural adjustment programmes in SSA during the 1980s and 1990s is that statistics agencies were weakened. Various specific examples are cited in Jerven (2013).
Impartial	Official statistics should be produced on an independent basis and thus be free from political and other influences (biases).	Political incentives to manipulate official statistics are widespread, especially where statistics are pertinent to election outcomes or specific performance targets. The behaviour of Argentina’s consumer

Criteria	Description	Example(s) of failure
		price index (set out in Cavallo, 2013) is a good example of how political influence may have biased the series.
Accurate	Official statistics should be based on adequate and appropriate source data and use methodologically sound techniques in the compilation process.	Numerous sources of inaccuracies in official statistics can be identified. One of the main concerns is that national accounts base years are not revised on a regular basis, meaning that (inter alia) weights for prices become outdated and new activities are excluded. In addition, in developing countries, accurate measurement of the informal sector (which is often a large % of the economy) is highly problematic and demands careful treatment via bespoke surveys. An example of the former is recent revisions of base years in various SSA countries, leading to large upward adjustments of GDP (e.g., by 89% in Nigeria). An example of the latter is the absence of (regular) surveys of the informal sector in many countries.
Comparable over time	Official statistics should be produced in a consistent manner over time, and (methodological) revisions are undertaken on a transparent and regular basis.	Irregular / delayed updating of national accounts base years (e.g., reference prices; see above) means that macroeconomic series can be subject to large and abrupt changes. This makes retropolation (to make a complete historical time series) particularly difficult. The paper by Wu (2007) outlines concerns around opaque revision of China's GDP that are relevant in this regard.
Comparable with other countries	Official statistics should be produced in accordance with (latest) international standards and compilation methods.	The methodological basis for producing core macroeconomic statistics varies across countries. As the IMF's WEO Country Data Documentation shows, numerous developing countries rely on an old (outdated) version of the UN's System of National Accounts (e.g., SNA 1993) or even have their 'own' system. There are very large differences in how countries calculate core price indexes, such as the consumer price index. For example, Mozambique's CPI is based on data from only three cities.

Criteria	Description	Example(s) of failure
Timely	Official statistics should be made available on a timely basis (e.g., in line with internationally accepted dissemination standards).	There are very large differences in dissemination speeds. This is exemplified by the IMF's WEO Country Data Documentation. As at April 2016, the latest CPI data available for the USA was from 2015 but in Senegal it was from 2011 and in Eritrea it was from 2009.
Accessible	Official statistics (and meta-data) should be easily accessible to all relevant users.	Concrete examples from the websites of individual statistics agencies can be cited here.

Question 2: “Use the government’s inter-temporal budget constraint to outline the structure of a simple debt sustainability analysis”

General comments

The starting point to answer this question is the government’s inter-temporal budget constraint. This is derived from the equation of motion of government debt, given in discrete time by:

$$(E_{gt} - \tau Y_t) + iL_{t-1} = \Delta L_t + \Delta M_{b,t}$$

where E is nominal government primary expenditure (before interest payments on debt); τY is the tax share of nominal income (GDP); i is the (average) nominal interest rate on outstanding government debt; L is the nominal debt stock; M_b is base money; and t is a time index. For simplicity the equation assumes τ and i are time invariant (see below for extensions).

Forward substitution of this equation yields the inter-temporal budget constraint (again in discrete time) running from t to T :

$$L_{t-1} = \sum_{i=0}^T \frac{(\Delta M_{t+i} + PS_{t+i})}{[(1+r)(1+\pi)]^i} + \frac{L_{t+T}}{[(1+r)(1+\pi)]^T}$$

where PS is the primary surplus and r, π are the real interest rate and inflation respectively.

It is generally helpful to state the inter-temporal budget constraint (ITBC) equation in share form. In discrete time this is given by:

$$l_{t-1} = \sum_{i=0}^T \left[(\theta m_{t+i} + ps_{t+i}) \frac{(1+g)^i}{(1+r)^i} \right] + l_{t+T} \frac{(1+g)^T}{(1+r)^T}$$

where g is the real growth rate of income; and θ captures the growth of base money: $\Delta M_t = [\mu/(1+\mu)]M_t = \theta M_t$.

In continuous time the ITBC is given (here running from $t=0$ to $t=T$) by:

$$l_0 = \int_0^T (\mu m_t + ps_t) e^{(g-r)t} dt + l_T e^{(g-r)T}$$

Key points

- Debt sustainability analyses (DSAs) employ the above basic framework (i.e., the equation of motion and derivations thereof) as a core point of departure. Students should demonstrate their knowledge of this framework.
- In addition, students should demonstrate (either implicitly or explicitly) that they understand what this framework means in practice. One way to do so – which is particularly helpful for concrete DSAs – is to re-state the ITBC to show the value of the debt stock at a given future date ($t=T$). In the continuous time version, this is given by:

$$l_T = l_0 e^{(r-g)T} - \frac{(\mu m_t + p s_t)}{r - g} (e^{(r-g)T} - 1)$$

- The above makes clear that debt sustainability easily holds when $g > r$, since the current debt stock will mechanically fall as a share of GDP (especially for very large T). Put differently, a core aspect of debt behaviour is not only the size of the primary surplus but also the magnitude $r - g$. (One can think about special cases of the above equation for $r > g$, $r = g$, and $r < g$).
- While debt sustainability analyses often take various forms, under the (reasonable) assumption that $r > g$ any given analysis must take a specific (explicit) view on what constitutes a ‘sustainable’ level or path for government debt – i.e., of itself, the ITBC does not tell us when/if a given level of debt is sustainable. Moreover, some comments on the timeframe within which we are to assess sustainability is valuable.
- A standard approach to analysing debt sustainability (as implemented by the IMF) is to simulate different scenarios for the debt path based on alternative assumptions for the core parameters and variables included in the equation for the terminal debt stock (e.g., as above). In addition, rules-of-thumb are often applied to decide whether debt stocks breach general sustainability criteria – e.g., for lower income countries the IMF recommends that the debt stock should be no more than 40% of GDP.
- Alternative approaches to sustainability analysis tend to impose conditions on the equation of motion for debt and/or impose target values for the terminal debt stock (e.g., the long-run boundary condition $l_T = 0$). For example, Roubini (2001) suggests debt is sustainable if the debt to GDP ratio is non-increasing, which is equivalent to imposing the condition: $l_0 = l_T$, and from which target values for the primary surplus (for example) can be ascertained.
- Even simple DSAs go beyond the basic equations shown here. Three particular extensions may be noted: (a) differentiating debt stocks according to types of creditor and/or costs – e.g., external vs internal debt; (b) taking into account variation in the exchange rate, which is critical where a large share of debt is denominated in foreign currency; and (c) including contingent fiscal liabilities.
- Students may refer to existing IMF DSAs to illustrate the approach and/or how the framework is implemented in practice.
- Students may note some of the limitations of the framework. In particular, growth (g) is assumed to be exogenous and we do not explicitly take into account feedback effects of debt stocks on r .

Question 3: “Equations (1a) – (1d) on the following page set out the basic Polak model, which represents the heart of a simplified Financial Programming framework. Table 1 (also overleaf) describes historical (2014-2015) and projected (2016-2020) values for the parameters, exogenous variables and policy instruments of a stylized (toy) economy”

(a) Use the Polak model to complete the projections in Table 1 for the endogenous outcomes: Y (nominal GDP); and ΔR (change in foreign reserves).

To solve the model we re-arrange the equations, solving for Y and ΔR . The relevant solutions are:

$$Y = \frac{1}{m+k} (X + K + \Delta D + kY_{-1})$$

$$\Delta R = \frac{k}{m+k} (X + K) - \frac{m}{m+k} \Delta D - \frac{mk}{m+k} Y_{-1}$$

Applying these solutions yields:

Item	Abbrev.	Historical		Projections				
		2014	2015	2016	2017	2018	2019	2020
Inverse velocity of money	k	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Propensity to import	m	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Imports	M	35.0	40.0	43.3	45.6	47.0	48.0	48.7
Money supply	L_s	70.0	80.0	86.7	91.1	94.1	96.0	97.4
Net capital inflows	K	25.0	25.0	10.0	10.0	10.0	10.0	10.0
Exports	X	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Change in domestic credit	ΔD	0.0	0.0	15.0	15.0	15.0	15.0	15.0
Nominal GDP	Y	87.5	100.0	108.3	113.9	117.6	120.1	121.7
Change in foreign reserves	ΔR	0.0	10.0	-8.3	-10.6	-12.0	-13.0	-13.7

(b) Interpret the completed scenario for the evolution of the economy.

Key points:

- Students should correctly distinguish between the exogenous variables (K , X), the model parameters (k , m) and the policy instrument (ΔD). [NB. Imports and the money supply are endogenous variables that are solved-out for the purpose of solving the model for the outcomes of interest].
- The scenario in the table shows that domestic credit increases by 15 currency units each year in 2016-2020 compared to zero change in the prior historical period. This would *appear* to be a response to an exogenous reduction in the level of capital inflows (K), by the same amount.

- The impact of the shift in sources of available financing is that while nominal GDP continues to grow (but at an ever-reducing pace) over the period but foreign exchange reserves fall at an ever-increasing rate. This reflects an inherent trade-off between internal and external balance contained in the Polak model.
- Over time, the behaviour of the economy stabilizes such that (changes to) domestic credit fully leak out within a year (as imports), financed by a fall in foreign reserves equal to the change in domestic credit. This behaviour would be more clearly evident if the projections were extended further. Such behaviour reflects the monetary approach to the balance of payments that informs the Polak model.
- From the table, we cannot tell if the (persistent) reduction in foreign reserves is sustainable over the longer-run. However, since the reductions are large as a share of GDP, one can reasonably assume that the policy decision to expand domestic credit will create new risks/vulnerabilities.

(c) In light of your results, reflect on the strengths and weaknesses of the basic Polak model.

Key strengths:

- Simple and transparent
- Minimal data requirements
- Highlights policy trade-offs (e.g., internal vs external balance)
- Useful for sensitivity analysis
- Focus on macroeconomic stabilization (short- to medium run)
- Can be (easily) extended in various ways to reflect specific country circumstances (e.g., see Boughton, 2001; Rao, 1999) – i.e., the model represents a basic starting point.
- Isolates *one* particular mechanism that can be a cause of economic destabilization (i.e., excess domestic credit creation)

Key weaknesses:

- Lag structure and treatment of dynamics is crude
- Notion of equilibrium in the model is not of a dynamic (forward-looking) sort
- Omission of key variables, namely: real output, price levels, exchange rates, government deficit (debts), and interest rates. These variables, if incorporated, would provide for *other* possible adjustment responses to increases in domestic credit. (However, these can be included relatively straightforwardly as extensions).
- An implicit assumption is that there is fairly limited spare capacity in the economy – i.e., domestic credit leaks out rapidly and does not bring idle factors of production into use.
- Absence of asset/liability stocks in the model (i.e., it is only a flow of funds model). As is evident from parts (a) and (b), a critical issue is how changes in stock balances affect behavior / create risks.
- Assumption of exogenous exports/capital inflows as well as fixed parameters is questionable in practice, even for small open economies.
- Historical performance of this class models is questionable – there is scant evidence to evaluate their predictive performance. However, empirical studies of the effects of IMF programmes suggest no clear benefits (see Steinwand and Stone, 2008).
- Not a comprehensive model of growth or development (but also not designed to be such)