Financial Fragility Modelling and Applications
Section IV: International economy (Greek dilemma)[1]

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[1] DISCLAIMER: The views expressed here are my own and do not necessarily represent those of the St. Edmund Hall, U. of Oxford or the Saïd Business School. Based on "Debt, Recovery Rates and the Greek Dilemma" Goodhart, Peiris & Tsomocos, JFS, 2018.

Our Questions

- Is there a policy of restructuring of Greek debt that is beneficial to both creditors and debtors?
- Can we think of debt restructuring as macro-prudential regulation?
- Can this be studied in a framework that permits quantitative (macroeconomic) analysis?

Our Results

In a decentralised two-country RBC model with incomplete markets and endogenous default, following a TFP shock:

- This turns out to be a policy of immediate leniency followed by harsher repayment terms
- Pro-cyclical renegotiating terms benefits the creditor to the detriment of the debtor
- Counter-cyclical does the opposite
- An intermediate policy benefits both by reducing aggregate volatility

Anatomy of a Crisis

The major restructuring of debt that occurred in 2012 resulted in a transfer from private creditors to Greece of around EUR 100 billion in present value terms resulting in haircuts of around 60% [2].

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[2]See ? for an excellent analysis of Greek restructuring episodes since 2010.

Anatomy of a Crisis

Following these bailouts, and despite a cumulative GDP fall of 25% between 2009 and 2014,

- the Greek government cut public primary expenditure by 30%,
- enacted large disinvestment in the economy,
- and managed to improve the the fiscal balance from a primary deficit of 10.3% of GDP in into a primary surplus of 0.4%[3].

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[3] ?

Calls for Renegotiation

- In spite of all these measures, the public debt to GDP ratio continued to climb, resulting in further calls for a bailout.
- In response, the IMF, in its June 26 2015 "Preliminary Draft Debt Sustainability Analysis"[4] strongly argue for restructuring:

*...these new financing needs render the debt dynamics unsustainable.... To ensure that debt is sustainable with high probability, Greek policies will need to come back on track **but also, at a minimum, the maturities of existing European loans will need to be extended significantly while new European financing to meet financing needs over the coming years will need to be provided on similar concessional terms.** But if the package of reforms under consideration is weakened further-in particular, through a further lowering of primary surplus targets and even weaker structural reforms-**haircuts on debt will become necessary**.*

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[4] IMF Country Report No. 15/165.

The European View

- This contrasts with the view of European creditor nations who view that reforms must occur before consideration of restructuring of debt and who unequivocally rule out any nominal haircut.

- In their statement on July 12 2015[5]:

  Against this background, in the context of a possible future ESM programme, and in line with the spirit of the Eurogroup statement of November 2012, the Eurogroup stands ready to consider, if necessary, possible additional measures (possible longer grace and payment periods) aiming at ensuring that gross financing needs remain at a sustainable level. ***These measures will be conditional upon full implementation of the measures to be agreed in a possible new programme and will be considered after the first positive completion of a review. The Euro Summit stresses that nominal haircuts on the debt cannot be undertaken.***

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[5] Eurosummit statement SN 4070/15

Our Argument

- We take the view that default is synonymous with restructuring of existing debt and argue that immediate restructuring, that reduces the present value of debt, would benefit both Greece as well as its creditor countries over the medium and long term.
- We consider a decentralized two country RBC model, describing Greece as the debtor nation, and Germany, the main creditor nation.
- Greek households can issue both secured and unsecured debt to German households and the possibility of renegotiating on unsecured debt exists.
- Expectations of Creditors determine whether a (good) default-free or (bad) default/renogiation steady-state/equilibrium prevails

Greek Growth Potential

- We implicitly assume that the Greek economy operates below its potential output and, hence additional investment may generate substantial GNP growth.
- This may seem paradoxical for the Greek economy as it has contracted in an unprecedented rated of over 25% during the last seven years.
- However, Greece's growth rates were often exceeding 10% during the 1950s resembling those of modern tiger economies in the late 1990s.
- Likewise, industrial production increased at a rate of 10% mostly during the 1960s. Greece consistently outperformed most European economies for most of the second world war period.

Greek Growth Potential

- What this underlines is the need for any such renegotiation to be accompanied by a business plan for the debtors (Greece), indicating how they can use additional funding to grow their way out of their (temporary) hole.

- A second requirement is for some commitment device to relate the release of additional funding (forgiveness) to the debtor (Greece) to their application of such extra funds to the business plan as originally developed and agreed between debtor and creditor.

- Put differently, we require that the business plan is time consistent and individually rational.

Greek Growth Potential

- More importantly this plan needs not to be imposed by the creditors but, rather, voluntarily be adopted and committed to fully by the debtors.
- The need to come up with such a business plan, and conditionality in releasing funds if, and only if, such plans are carried out, is a commonplace in cases of commercial bankruptcy;
- If such conditions can be met, we would then argue that immediate restructuring that reduces the present value of debt, would benefit both Greece as well as its creditor countries over the medium and long term.

Framework

- We consider a two country RBC model, describing Greece as the debtor nation, and Germany, the main creditor nation.
- Greek households can issue both secured and unsecured debt to German households and the possibility of renegotiating on unsecured debt exists.
- Greek's may, at a cost, restructure or renegotiate unsecured debt and obtain a haircut

Default and the Intertemporal Trade-Off

- We explicitly model the decision to default
- We show that that the default channel, that exacerbates the volatility of consumption, may actually be reduced with more lenient, but appropriate, debt restructuring terms.
- Put another way, we argue that the dilemma is not whether there is a moral duty of creditor nations to transfer resources to Greece, but whether creditors are willing to trade off short-term losses for medium and long-run gains.

Remark

- We postulate a Greek Representative Household-Government and Representative Production Sector
- The unified Household-Government Greek representative agent allows us to unify output, tax revenue and external debt
- Each massless Greek representative agent takes decisions to default, taking as given the decisions of its fellow citizens. "As if"

Credit Conditions and Restructuring

I still owe money on the car and motorboat I can't afford to use. Even a holiday loan I'd forgotten about...I'm living with my mother looking for work and waiting for the bank to come up with another restructuring offer.

Claim 1: Moral Hazard matters

Credit Conditions and Restructuring

"Business to business payments have almost been paused", one Athens businessman says. "They are just rolling over postdated cheques."
"For Greek banks, mortgage loans left un-serviced by strategic defaulters have become a particular headache, especially since the Syriza-led government says it is committed to protecting low-income homeowners from foreclosures on their properties"
"There is a real issue of moral hazard...Around 70 per cent of restructured mortgage loans aren't being serviced because people think foreclosures will only be applied to big villa owners", one banker said.

Claim 2: Renegotiation costs are contingent on aggregate default rates

Credit Conditions and Restructuring

Given the acute challenges of the Greek financial sector, the total envelope of a possible new ESM programme would have to include the establishment of a buffer of EUR 10 to 25bn for the banking sector in order to address potential bank recapitalisation needs and resolution costs, of which EUR 10bn would be made available immediately in a segregated account at the ESM.

Claim 3: **Renegotiation is contingent on private-sector financial vulnerability**

Credit Conditions and Restructuring

Against this background, in the context of a possible future ESM programme, and in line with the spirit of the Eurogroup statement of November 2012, the Eurogroup stands ready to consider, if necessary, possible additional measures (possible longer grace and payment periods) aiming at ensuring that gross financing needs remain at a sustainable level.

Claim 4: Renegotiation is contingent on economic activity and debt sustainability

Credit Conditions and Restructuring

- Claims 1 - 4 motivate our "Credit Conditions" macro-variable that governs the (effort) cost of renegotiating debt.
- Greek debtor households decide how much debt to renegotiate taking it into account
- Creditors agree to reduce the present-value of debt obligations by a fraction sought: the "recovery rate"
- Our policy analysis is on the optimal "recovery rate"

Credit Conditions Variable

$$\Omega_t^{GRC} \equiv const * \frac{K_{t-1}^{GRC}}{B_{u,t-1}^{GRC}(1 + r_{t-1}^u)} \frac{\phi^{GRC}}{\left(def_t^{GRC}\right)^\gamma}. \tag{1}$$

We term γ the *default accelerator*. Compare with Gourinchas et al (2016):

- Default is endogenous here,
- depends on debt to capital (GDP proxy) ratio
- depends on the amplification that default of individuals have on the propensity of others to default (banking system/balance sheet)

In Gourinchas et al. It depends, for governments and households, exogenously on debt and GDP.

Greek Welfare Function

$$W^{GRC} = \sum_{s=0}^{\infty} \beta^s \mathbb{E}_t \left[\frac{(c_{t+s}^{GRC})^{1-\sigma} - 1}{1 - \sigma} - \frac{\eta}{2} (lab_{t+s}^{GRC})^2 \right.$$

$$\left. - \frac{\Omega_{t+s}^{GRC}}{2} \left\{ def_{t+s}^{GRC} (R_{t+s-1}^u) b_{u,t+s-1}^{GRC} \right\}^2 \right], \tag{2}$$

The renegotiation cost enforced on Greeks that choose to default on $def_t^{GRC}\%$ of their unsecured debt is

$$\frac{\Omega_{t+s}^{GRC}}{2} \left\{ def_{t+s}^{GRC} (R_{t+s-1}^u) b_{u,t+s-1}^{GRC} \right\}^2, \tag{3}$$

where Ω_t^{GRC} is a pro-cyclical macro-variable which governs the interpretation of economic data in the process of renegotiation.

Greek Budget Constraint

$$\kappa_t def_t^{GRC}(R_{t-1}^u)b_{u,t-1}^{GRC} + (1 - def_t^{GRC})(R_{t-1}^u)b_{u,t-1}^{GRC} - b_{u,t}^{GRC}$$

$$= \pi_t^{GRC} + w_t^N lab_t^{GRC} - c_t^{GRC}$$
$$+ (1 - \delta)cap_{t-1}^{GRC} - cap_t^{GRC}$$
$$+ b_{s,t}^{GRC} - (R_{t-1}^s)b_{s,t-1}^{GRC} - \frac{adj_s^{GRC}}{2}(b_{s,t}^{GRC} - \bar{b}_{s,t}^{GRC})^2 \qquad (4)$$

Greek Secured Borrowing

$$b_{s,t-1}^{GRC}(R_{t-1}^s) \leq coll_s cap_{t-1}^{GRC}(1-\delta), \tag{5}$$

- Here the margin is fixed at $coll_s$
- Default is ruled out

Compare with Gourinchas et al (2016)

- For households, they impose the borrowing limit from the lenders problem
- For Banks, the borrowing limit depends on the equity of banks

Default Premium and Endogenous Capital Structure

We obtain the following relationship

$$\frac{\bar{R}_s}{\bar{R}_u} = \frac{\bar{R}_s - \chi(1-\delta)}{\bar{R}_k - \chi(1-\delta)}, \tag{6}$$

which is simply

$$1 - \bar{def} = \frac{1}{\phi^{GRC}} = \frac{\bar{R}_s}{\bar{R}_u} \tag{7}$$

- We term ϕ^{GRC} the *default wedge*.
- Default drives down the capital stock, which (further) reduces the secured-unsecured debt ratio.

Greece

$$F(cap_{t-1}^{GRC}, lab_t^{GRC}) \equiv A_t(cap_{t-1}^{GRC})^a(lab_t^{GRC})^{1-a}. \tag{8}$$

- The capital stock is rented competitively each period
- Capital depreciates at a rate of δ % each period
- Labour is paid a competitive wage w_t^N.
- $A_t = e^{\varepsilon_t^A} A$ is the total factor productivity
- $\varepsilon_t^A = \rho^A \varepsilon_{t-1}^A + u_t^A$ is an autoregressive process with shock u_t^A.
- National Production is defined as $Y_t = F(cap_{t-1}^{GRC}, lab_t^{GRC})$.

Greek Firms

Profits of Greek firms are

$$\pi_t^{GRC} \equiv F(cap_{t-1}^{GRC}, lab_t^{GRC}) + (1 - \delta)cap_{t-1}^{GRC} - w_t^N lab_t^{GRC} - R_t^k cap_{t-1}^{GRC} \qquad (9)$$

- Firms maximise profits each period
- factor prices being determined at the marginal product values

$$w_t^N = \frac{\partial F(cap_{t-1}^{GRC}, lab_t^{GRC})}{\partial lab_t^{GRC}}, \qquad (10)$$

$$R_t^k = \frac{\partial F(cap_{t-1}^{GRC}, lab_t^{GRC})}{\partial cap_{t-1}^{GRC}} + 1 - \delta. \qquad (11)$$

German Preferences

Preferences are CRRA utility function for consumption.

$$W^{GER} = \max_{c, b_s, b_u} \sum_{s=0}^{\infty} \beta^s \mathbb{E}_t \left\{ \frac{\left[c_{t+s}^{GER} \right]^{1-\sigma} - 1}{1 - \sigma} \right\}, \tag{12}$$

German Budget Constraint

$$c_t^{GER} + b_{u,t}^{GER} + b_{s,t}^{GER} + \frac{adj_s^{;GER}}{2}(b_{u,t}^{GER} - \bar{b}_{u,t}^{GER})^2 + NFA_t^{GER}$$

$$= (R_{t-1}^u)(1 - def_t^{GRC})b_{u,t-1}^{GER} + \kappa_t(R_{t-1}^u)(def_t^{GRC})b_{u,t-1}^{GER}$$

$$+ (R_{t-1}^s)b_{s,t-1}^{GER} + NFA_{t-1}^{GER}(R_t^{NFA}). \tag{13}$$

Note that in the deterministic steady state $\frac{1}{\beta^{GER}} = \bar{R}_s = R\bar{E}P\ \bar{R}_u$.

Calibration

Parameter	Description	Model Value	Source Value	Reference
κ_u	Recovery rate on unsecured debt	0.5	0.5	?
$E(def)$	Mean default rates	5%	3.1%	S&P
$StD(def)$	Variance of default rates	.31%	3.46%	S&P
σ	Coefficient of relative risk aversion	2	2	?
ρ_A	Persistence of TFP shock	.675	.675	?
δ	Depreciation rate	2.5%	1.75%	?
a	Share of Capital Income in Greece	.34	.34	?
lab	Steady-state labour supply	.353	.353	?
b_u/b_s	Unsecured-to-Secured Debt	.5	.25	?
$(b_s + b_u)/Y^{GRC}$	Greek Debt-to-GDP	130%	130%	Eurostat
$NFA/(b_s + b_u)$	Ex-Greece, German Net Foreign Assets	30	29 to 60	World Bank

Table: List of Calibrated Values

Our Model

Parameter	Description	
β^{GER}	German rate of time preference	0.995
β^{GRC}	Greek rate of time preference	0.970
ϕ^{GRC}	default wedge	.950
γ	default accelerator	.930
A_t	total factor productivity	1.052
ρ_A	autoregressive coefficient for TFP	0.675
a	share of income to capital	.340
δ	depreciation rate	.025
σ	coefficient of relative risk aversion	2
η	household preference for labour	7.656

Table: List of Parameters

Restructuring Policies

$\kappa_t = \bar{\kappa} e^{\varepsilon_t^{\kappa}}$ where $\varepsilon_t^{\kappa} = \rho^{\kappa} \varepsilon_{t-1}^A + u_t^{\kappa}$

- Acyclical (Acyc): $\rho^k = u_t^{\kappa} = 0$
- Procyclical (Pro): $\rho^k = -.2\rho^A$, $u_t^{\kappa} = -10 u_t^A$
- Countercyclical (Countc): $\rho^k = .2\rho^A$, $u_t^{\kappa} = 10 u_t^A$
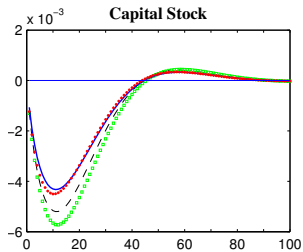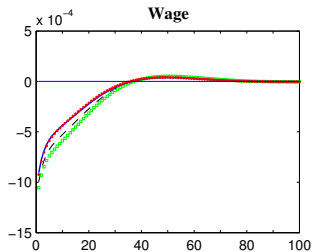- Intermediate(Int): $\rho^k = -.2\rho^A$, $u_t^{\kappa} = 10 u_t^A$

Conditional Welfare

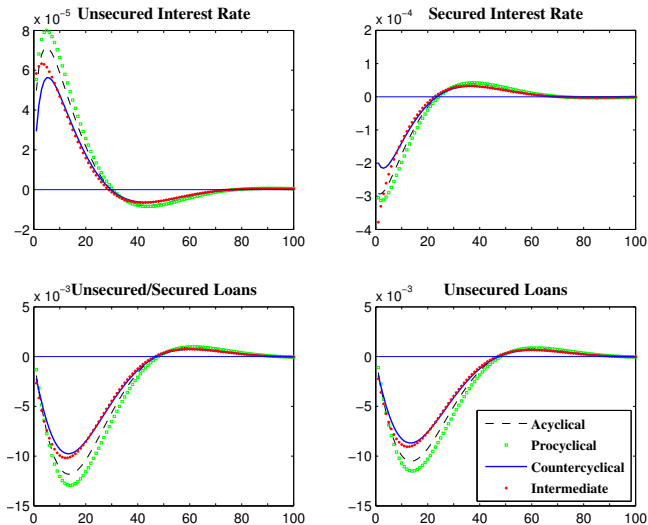|	Acyclical	Procyclical	Countercyc	Interm
$\mathbb{E}\{W^{GER}|0\}$	-0.0034	-0.0033	-0.0036	-0.0032
$\mathbb{E}\{W^{GRC}|0\}$	-0.0003	-0.0006	0.0002	-0.0003

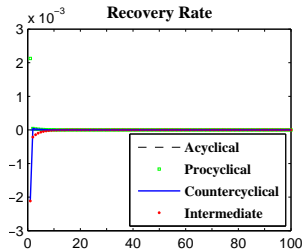Table: Conditional Welfare Analysis
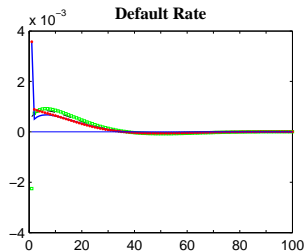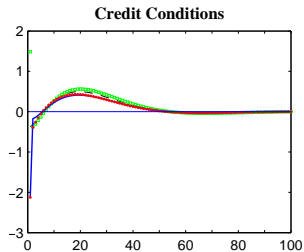
Impulse Responses
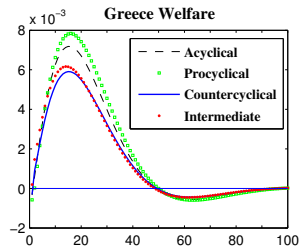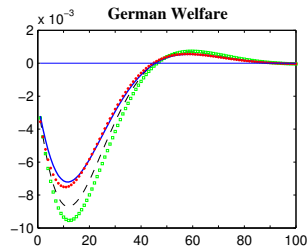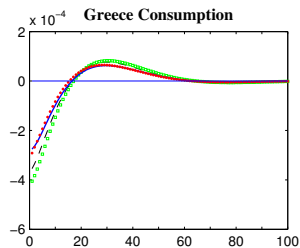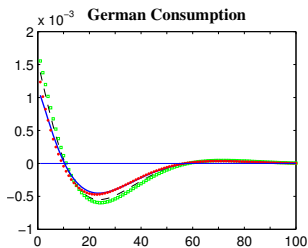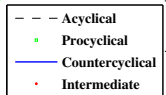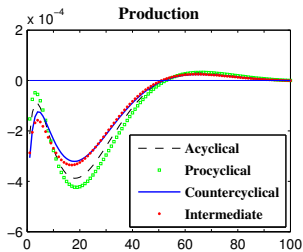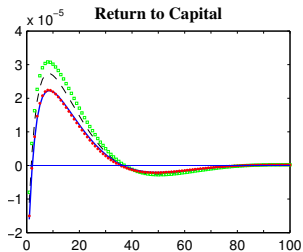
Impulse Responses

Impulse Responses

Impulse Responses

- The difficult political environment in Greece can be considered as the outcome of an inherent time-inconsistency problem in past agreements.
- In our model we examine only the time-consistent path of debt agreements, and so abstract away from important considerations of commitment to presumably Pareto-improving potential agreements.
- Note, however, that the moral hazard aspect of debt is certainly captured since in our model Greeks suffer a cost of reneging on their contractual obligations: the promises themselves are made with a common understanding that reneging on them is possible (alongside their subsequent associated costs).
- In our model, funds arising from debt forgiveness are used efficiently. This is in contrast to the popular narrative whereby forgiveness will result in inefficiencies.
- Finally one might argue that quantitative easing and debt monetisation could serve a similar role as our debt restructuring argument. However this neglects the fact that due to the heterogeneity of the Eurozone countries this might increase discord among Eurozone member states.