NATIONAL RESEARCH UNIVERSITY
HIGHER SCHOOL OF ECONOMICS

Kanat S. Isakov, Sergey E. Pekarski

FINANCIAL REPRESSION AND LAFFER CURVES

BASIC RESEARCH PROGRAM
WORKING PAPERS

SERIES: ECONOMICS
WP BRP 113/EC/2015

Kanat S. Isakov [1], *Sergey E. Pekarski* [2]

FINANCIAL REPRESSION AND LAFFER CURVES

This paper uses a simple calibrated general equilibrium model to evaluate the revenue from financial repression and its impact on Laffer curves for consumption, capital and labor taxes. By imposing a requirement for households to hold public debt with a below-market rate of return the government distorts optimal household allocation and raises extra revenues. Tighter financial repression shifts Laffer curves for labor and consumption down, but increases revenue from capital income taxation. Total budget revenue increases, which allow financing more public goods and can be welfare-improving.

Keywords: financial repression; tax distortions; Laffer curve.

JEL Classification: E62; G28; H21; H24; H31; H63

[1] National Research University Higher School of Economics. Laboratory for Macroeconomic Analysis, Assistant Junior Research Fellow; E-mail: kisakov@hse.ru

[2] National Research University Higher School of Economics. Laboratory for Macroeconomic Analysis, Senior Research Fellow; Department of Theoretical Economics, Professor; E-mail: spekarski@hse.ru

The study was implemented in the framework of the Basic Research Program at the National Research University Higher School of Economics in 2015.

1. Introduction

During fiscal stress governments often practice financial repression, which distorts the market mechanisms setting interest rates and allows them to raise extra revenue and decrease debt service costs. Forms of financial repression are various and in general they are perceived as an indirect taxation of households or financial intermediaries (see, e.g. Reinhart, 2012). But distortionary taxes interact with each other. Could it be that while raising extra revenue from financial repression the government loses even more from the shortfall of other taxes? While the literature provides some estimates of the revenue from financial repression (Giovannini and de Melo, 1993; Reinhart and Sbrancia, 2011), this paper investigates how it affects Laffer curves for ordinary taxes.

The particular form of financial repression considered is the regulation which stimulates financial intermediaries to hold more government bonds to meet the capital adequacy ratio (e.g., Basel III). Leaving aside macro-prudential reasoning, we interpret this regulation as compelling banks (or, ultimately, households) to invest in a portfolio composed of capital, which provides the market rate of return, and public debt, which provides a below-market rate of return. Indeed, by enlarging demand for public debt the government can effectively decrease the real interest rate on debt to close to zero or even make it negative.

Recognizing this "compelled investment" highlights the distortionary effect of this policy on investor behaviour, and revenues from capital income taxation. Since in a general equilibrium capital accumulation is related to labor and consumption choices, financial repression affects the corresponding taxes as well. In this short paper we do not formally question financial repression in the context of optimal taxation. Instead, we employ the calibration for USA and EU-14 from Trabandt and Uhlig (2011) to estimate the revenue from repression and show its non-trivial impact on other tax revenues and welfare.

2. The model

Following Cooley and Hansen (1992) we consider an economy of atomistic representative households with an infinite life span distributed over the unit interval. Households pay consumption, labor and capital taxes. They are also obliged to hold government bonds in a proportion to the stock of capital. Government bonds deliver below-market rate of interest. This is a simple way to introduce financial repression allowing us to skip explicit modelling of financial intermediaries and consider households as the ultimate captive agents.

2.1. Households

The representative household j maximizes life-time utility:

$$\max \sum_{t=0}^{\infty} \beta^t \big(\sigma \ln c_t(j) + (1-\sigma)\ln\big(1-h_t(j)\big) + \gamma \ln G_t\big), \quad 0<\sigma<1,\ \gamma>0, \tag{1}$$

where β is the subjective discount rate, $c_t(j)$ is period t real private consumption, $h_t(j)$ stands for hours worked, and G_t is consumption of public goods.

Private consumption is subject to the cash-in-advance constraint:

$$(1+\tau^c)\pi_t c_t(j) = m_{t-1}(j), \tag{2}$$

where $m_{t-1}(j)$ stands for real money balances at the end of period $t-1$, π_t is the period t gross inflation rate, and τ^c is the tax rate for consumption.

Household portfolio of assets consists of capital, money and government bonds. Capital accumulation is given by:

$$k_{t+1}(j) = (1-\delta)k_t(j) + i_t(j), \tag{3}$$

where $i_t(j)$ is the period t investment , $k_t(j)$ is capital at the beginning of period t and δ is the rate of depreciation. The dynamic budget constraint is:

$$\begin{aligned} &i_t(j) + m_t(j) + b_t(j) = \\ &\qquad = (1-\tau^h)w_t h_t(j) + (1-\tau^k)(r_t-\delta)k_t(j) + \delta k_t(j) + \frac{R^b}{\pi_t} b_{t-1}(j), \end{aligned} \tag{4}$$

where $b_t(j)$ are government bonds, w_t and r_t are the wage and the rate of return on capital, and τ^h and τ^k are tax rates for labor and capital income.[3]

2.2. Production

The aggregate output is produced using the constant return to scale technology:

$$Y_t = K_t^{\theta} H_t^{1-\theta}, \quad 0 < \theta < 1, \tag{5}$$

where $K_t = \int_0^1 k_t(j)dj$ is aggregate capital, $H_t = \int_0^1 h_t(j)dj$ is aggregate labor.[4] Assuming perfectly competitive factor markets we have:

$$Y_t = r_t K_t + w_t H_t, \tag{6}$$

where the rate of return on capital and the wage are given by:

$$r_t = \theta K_t^{\theta-1} H_t^{1-\theta}, \tag{7}$$

$$w_t = (1-\theta) K_t^{\theta} H_t^{-\theta}. \tag{8}$$

2.3. Government

The government finances purchases G_t by levying taxes, collecting seigniorage and imposing a requirement for households to hold public debt. The dynamic government budget constraint is:

$$G_t + \frac{R^b}{\pi_t} B_{t-1} = B_t + T_t + \frac{\phi - 1}{\pi_t} M_{t-1}, \tag{9}$$

where $B_t = \int_0^1 b_t(i)di$ is the aggregate real public debt with the gross nominal interest rate R^b, $M_t = \int_0^1 m_t(i)di$ stands for the aggregate real money balances, and $\phi = \pi_t M_t / M_{t-1}$ is the growth rate of nominal base money. Tax revenue is given by:

$$T_t = \tau^c C_t + \tau^h w_t H_t + \tau^k (r_t - \delta) K_t, \tag{10}$$

[3] Following the literature we assume tax deductible capital depreciation.
[4] We use convenient notation where lowercase letters correspond to individuals and uppercase letters correspond to aggregates.

where $C_t = \int_0^1 c_t(i)di$ is aggregate consumption.

The government pursues financial repression by imposing a requirement for households to hold government bonds in proportion to their capital:

$$b_t(j) = \rho k_t(j),\ \rho > 0\,, \tag{11}$$

and setting R^b and ϕ such that $R^b/\pi_t < (1-\tau^k)(r_t - \delta)$.

3. Competitive equilibrium

Given the initial values of all stock variables, a competitive equilibrium is the set of sequences for household allocations $\{c_t, h_t, m_t, k_t, b_t, i_t\}_{t=0\ldots\infty}$, factor prices $\{w_t, r_t\}_{t=0\ldots\infty}$, inflation $\{\pi_t\}_{t=0\ldots\infty}$, and aggregates $\{C_t, Y_t, H_t, M_t, K_t, B_t, G_t, T_t\}_{t=0\ldots\infty}$ such that

(i) Households choose $\{c_t, h_t, m_t, k_t, b_t, i_t\}_{t=0\ldots\infty}$ to maximize (1) s.t. (2)–(4) and (11), taking factor prices $\{w_t, r_t\}_{t=0\ldots\infty}$, inflation $\{\pi_t\}_{t=0\ldots\infty}$, and policy variables $\{\tau^h, \tau^k, \tau^c, \rho, R^b, \phi\}$ as given;

(ii) $C_t = c_t, Y_t = y_t, H_t = h_t, M_t = m_t, K_t = k_t, B_t = b_t$ for all *t*;

(iii) Factor prices are determined by (7) and (8);

(iv) Government purchases are determined by (9) given $\{\tau^h, \tau^k, \tau^c, \rho, R^b, \phi\}$.[5]

Using the envelope theorem we can describe the optimal household allocations in terms of the choice of $m_t(i)$ and $k_{t+1}(i)$. The corresponding first order conditions are:

$$\frac{1-\sigma}{1-h_t}\frac{\partial h_t}{\partial k_{t+1}} + \beta\,\frac{1-\sigma}{1-h_{t+1}}\frac{\partial h_{t+1}}{\partial k_{t+1}} + \beta^2\frac{1-\sigma}{1-h_{t+2}}\frac{\partial h_{t+2}}{\partial k_{t+1}} = 0, \tag{12}$$

$$\frac{1-\sigma}{1-h_t}\frac{\partial h_t}{\partial m_t} - \frac{\sigma}{c_t}\frac{\partial c_{t+1}}{\partial m_t} = 0 \tag{13}$$

Solving equations (12)–(13) allows us to find a closed from solution for r, H, w, K and C in the steady state in terms of policy variables τ^h, τ^k,τ^c, ρ and R^b/π, where $\pi = \phi$:

$$r = \frac{1-\beta}{\beta(1-\tau^k)} + \delta + \frac{\rho}{1-\tau^k}(1-\beta\,R^b/\pi), \tag{14}$$

$$H = \frac{\sigma}{1-\sigma}\beta\left[\frac{\sigma}{1-\sigma}\beta + 1 + \frac{\theta}{1-\theta}\frac{1-\tau^k}{1-\tau^h}\left(1-\frac{\delta}{r}\right) + \frac{\rho}{r}\frac{\theta}{1-\theta}\frac{1-R^b/\pi}{1-\tau^h}\right]^{-1}, \tag{15}$$

$$w = (1-\theta)\left(\frac{r}{\theta}\right)^{\theta/\theta-1}, \tag{16}$$

$$K = \left(\frac{r}{\theta}\right)^{1/\theta-1} H, \tag{17}$$

[5] We implicitly assume that fiscal policy is feasible, i.e. the set $\{\tau^h, \tau^k, \tau^c, \rho, R^b, \phi\}$ is such that $G_t > 0$ for all *t*.

$$C = \beta \frac{\sigma}{1-\sigma} \frac{(1-\tau^h)w}{(1+\tau^c)\pi}(1-H). \tag{18}$$

The steady state is distorted by financial repression if $R^b/\pi < 1/\beta$ and $\rho > 0$. It follows from equations (14)–(18), that whether tighter financial repression takes the form of higher ρ or lower R^b/π, it leads to an increase in r and a decrease in K, w, H and C. Labor income tax revenue $T^h = \tau^h wH$ and consumption tax revenue $T^c = \tau^c C$ decrease, but the change in capital income tax revenue $T^k = \tau^k(r-\delta)K$ is ambiguous.

4. Estimated Laffer curves and revenue from financial repression

To evaluate the impact of financial repression on tax revenues we use the same calibration and the baseline tax policy sets (see Table 1) as in Trabandt and Uhlig (2011) for the U.S. and EU-14.[6] Fig. 1 demonstrates that financial repression, $R^b/\pi < 1/\beta$, shifts the Laffer curve for labor income down, but increases revenue from capital income taxation for reasonable tax rates τ^k.[7] Fig. 2 demonstrates similar implications of tighter financial repression in form of higher ρ. Fig. 3 shows the "Laffer hills" (isoclines) for total government revenue, which is defined as a finance of G and includes gross revenue from financial repression, $(1 - R^b/\pi)B$. Financial repression decreases Y, but increases G/Y from 23.28% to 26.03% for USA (from 34.13% to 37.33% for EU-14). Welfare decreases for the baseline $\gamma = 0.2$. But it increases if $\gamma > 0.24$ for USA ($\gamma > 0.54$ for EU-14).

Table 1
Calibration and the baseline tax policy sets.

	τ^c	τ^k	τ^h	θ	δ	σ	β	γ	ρ	R^b	π
USA	0.05	0.36	0.28	0.35	0.083	0.32	0.985	0.2	0.25	1.01	1.02
EU-14	0.17	0.33	0.41	0.38	0.07						

We can write the steady-state budget constraint (9) as:

$$G + \frac{1-\beta}{\beta}B = \left(\frac{1}{\beta} - \frac{R^b}{\pi}\right)B + T + \frac{\pi - 1}{\pi}M, \tag{19}$$

and define net revenue from financial repression as $(1/\beta - R^b/\pi)B$, which is the steady-state analogue to the "liquidation effect" discussed in Reinhart and Sbrancia (2011). It finances 6.92% of government spending, $G + (1/\beta - 1)B$, and is 1.88% of output for USA (6.02% and 2.33%, respectively, for EU-14). As follows from (14), (15) and (17) this net revenue decreases in R^b/π for any $\rho > 0$, and increases in ρ for $R^b/\pi < 1/\beta$. Fig. 4 provides an illustration. Fig. 5 shows Laffer hills in spaces $(\tau^k, 1/\beta - R^b/\pi)$ and $(\tau^h, 1/\beta - R^b/\pi)$.

Finally, we estimate the substitutability or complementarity between various policy instruments. Tables 2 and 3 provide marginal rates of substitution between pairs of $\{R^b, \rho, \tau^c, \tau^k, \tau^h\}$ keeping constant total steady-state government revenue and utility (welfare in our representative agent setup), respectively. Several observations are particularly interesting. First, both in terms of constant government revenues and welfare, loosening financial repression, $dR^b > 0$, requires a relatively

[6] The choice of $\rho = 0.25$ corresponds to public debt to GDP ratio of 0.75 for USA (0.93 for EU-14).
[7] For the sake of space and keeping the focus here we discuss the most important results. More is available in a separate Appendix to the paper. In particular, we do not show Laffer curve for consumption tax, which is monotonically increasing in τ^c as in Trabandt and Uhlig (2011).

large compensation in terms of higher τ^k (1 p.p. increase in R^b requires more than 7 p.p. increase in τ^k). This explains why governments tend to impose financial repression as an indirect (hidden) taxation. Second, as Fig. 5(a) and Table 2 show, to keep government revenues constant, lower $R^b < \pi/\beta$ should be supplemented by even higher ρ, which means tighter financial repression in terms of both instruments.[8] However, as Table 3 shows, a welfare-neutral decrease in R^b (tighter repression) requires a balancing decrease in ρ (looser repression).

Table 2
Estimated marginal rates of substitution between policy instruments keeping total government revenue constant for USA (EU-14 in brackets).

	dR^b	$d\rho$	$d\tau^c$	$d\tau^k$	$d\tau^h$
dR^b		**-11.854** (-3.486)	**1.650** (1.445)	**7.563** (8.345)	**1.780** (1.809)
$d\rho$	**-0.084** (-0.287)		**0.139** (0.414)	**0.638** (2.394)	**0.150** (0.519)
$d\tau^c$	**0.606** (0.692)	**7.186** (2.413)		**-4.585** (-5.777)	**-1.079** (-1.252)
$d\tau^k$	**0.132** (0.120)	**1.567** (0.418)	**-0.218** (-0.173)		**-0.235** (-0.217)
$d\tau^h$	**0.562** (0.553)	**6.660** (1.927)	**-0.927** (-0.799)	**-4.249** (-4.613)	

Table 3
Estimated marginal rates of substitution between policy instruments keeping welfare constant for USA (EU-14 in brackets).

	dR^b	$d\rho$	$d\tau^c$	$d\tau^k$	$d\tau^h$
dR^b		**5.013** (8.677)	**-3.753** (5.621)	**7.057** (7.537)	**-4.539** (2.628)
$d\rho$	**0.200** (0.115)		**0.749** (-0.648)	**-1.408** (-0.869)	**0.906** (-0.303)
$d\tau^c$	**-0.266** (0.178)	**1.335** (-1.544)		**1.880** (-1.341)	**-1.209** (-0.468)
$d\tau^k$	**0.142** (0.133)	**-0.710** (-1.151)	**0.5320** (-0.746)		**0.643** (-0.349)
$d\tau^h$	**-0.220** (0.381)	**1.104** (-3.301)	**-0.827** (-2.139)	**1.555** (-2.868)	

5. Conclusion

Being a form of indirect and distortionary taxation, financial repression interacts with other taxes. We introduce financial repression, as the requirement for households to hold government debt with a below-market rate of interest, into the calibrated general equilibrium model and show that tighter financial repression shifts Laffer curves for consumption and labor taxes down, but increases the revenue from capital income tax. If the revenue from repression finances valuable public goods, it can be welfare-improving notwithstanding the decrease in output. The substitution

[8] Moreover, the revenue from repression is more sensitive to changes in R^b.

of financial repression revenue by heavier capital income taxation requires a relatively large increase in the capital tax rate, which provides the political reasoning for pursuing less visible financial repression.

References

Cooley T.M., Hansen G.D. (1992) “Tax Distortions in a Neoclassical Monetary Economy”. *Journal of Economic Theory*, 58, pp. 290-316.

Giovannini A., de Melo M. (1993) “Government Revenue from Financial Repression”. *American Economic Review*, 83(4), pp. 953-963.

Reinhart C.M. (2012) “The Return of Financial Repression”. *Banque de France Financial Stability Review*, 16, pp. 37-48.

Reinhart C.M., Sbrancia M.B. (2011) “The Liquidation of Government debt”. *NBER Working Paper* №16983.

Trabandt M., Uhlig H. (2011) “The Laffer Curve Revisited”. *Journal of Monetary Economics*, 58, pp. 305-327.

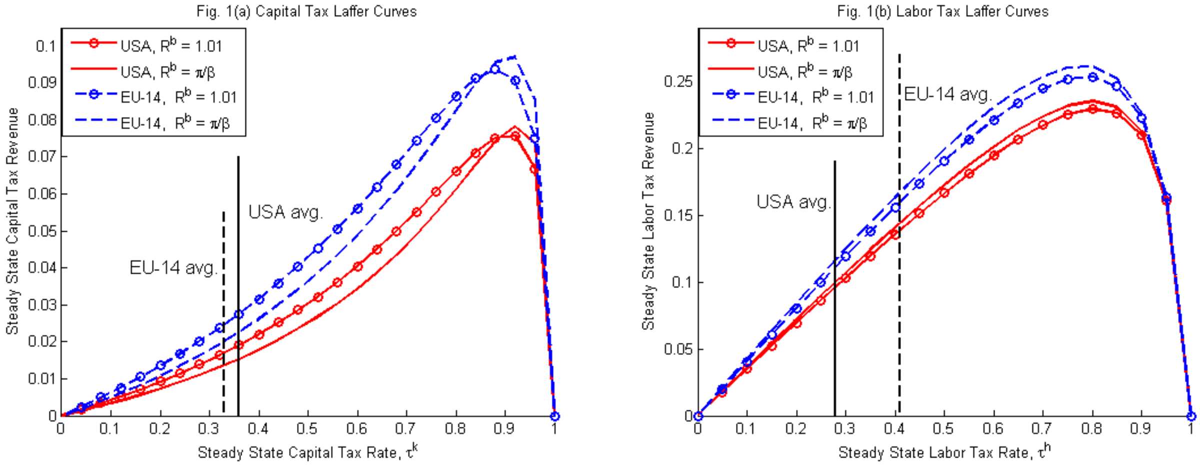

Fig. 1. The impact of financial repression ($R^b < \pi/\beta$) on Laffer curves for capital and labor taxes

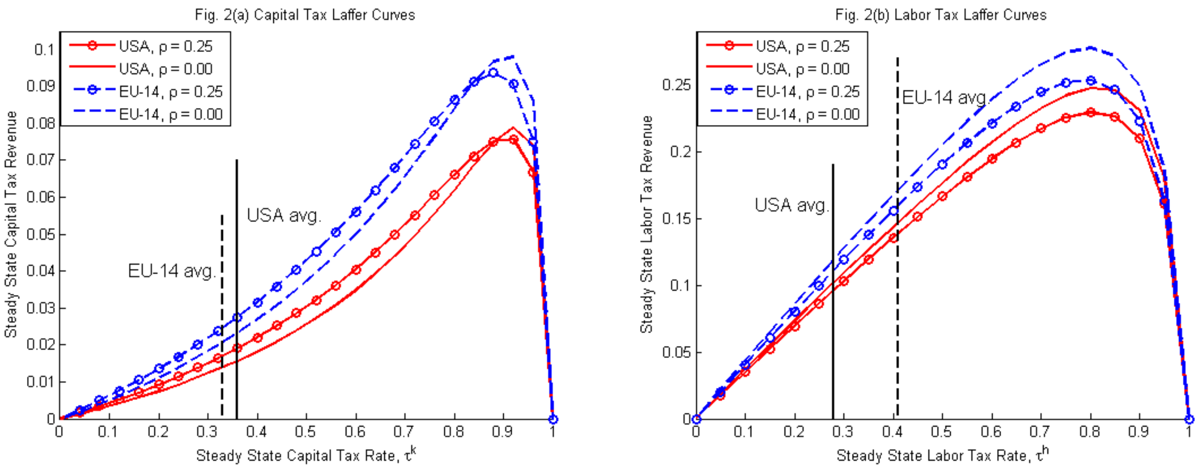

Fig. 2. The impact of financial repression (higher ρ) on Laffer curves for capital and labor taxes

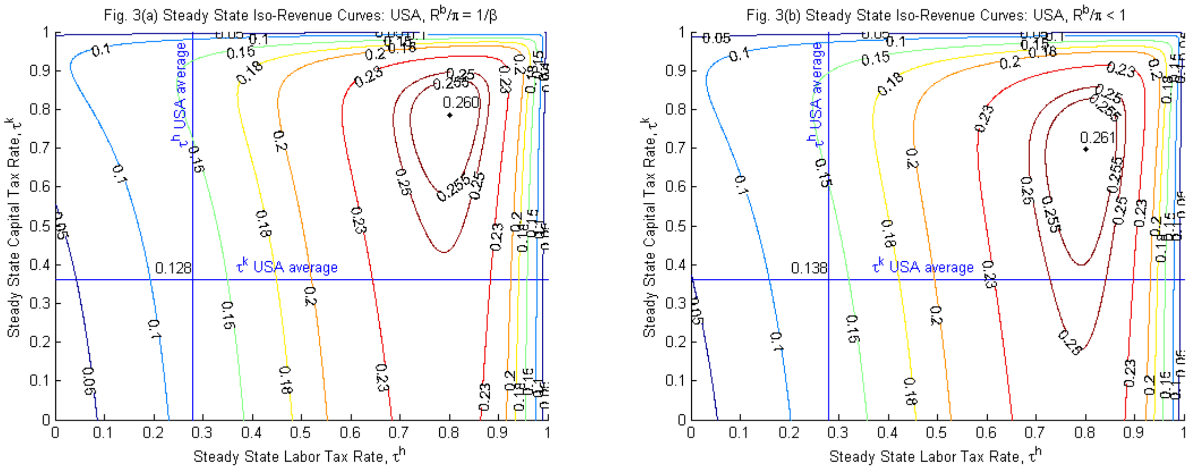

Fig. 3. The impact of financial repression on Laffer hills for capital and labor taxes

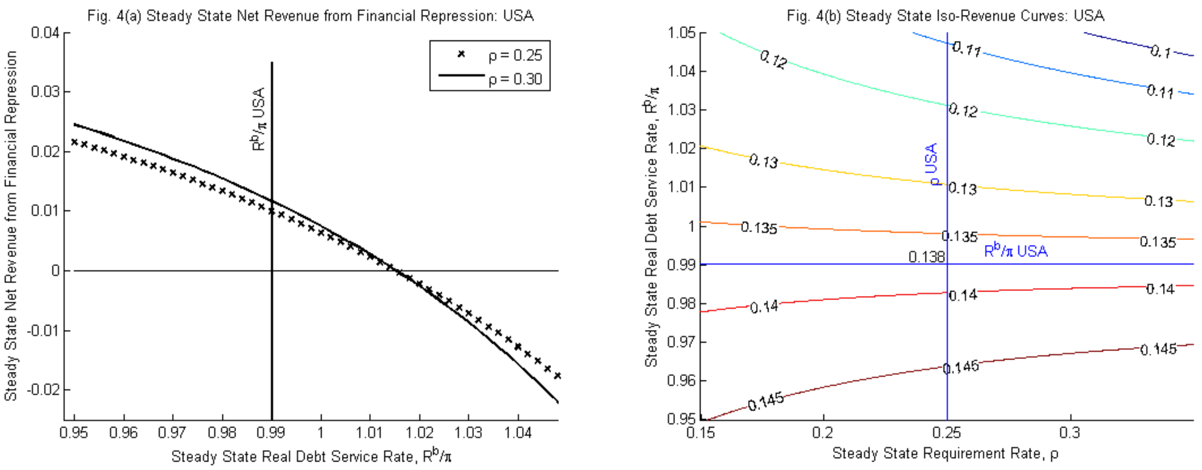

Fig. 4. Revenue from financial repression

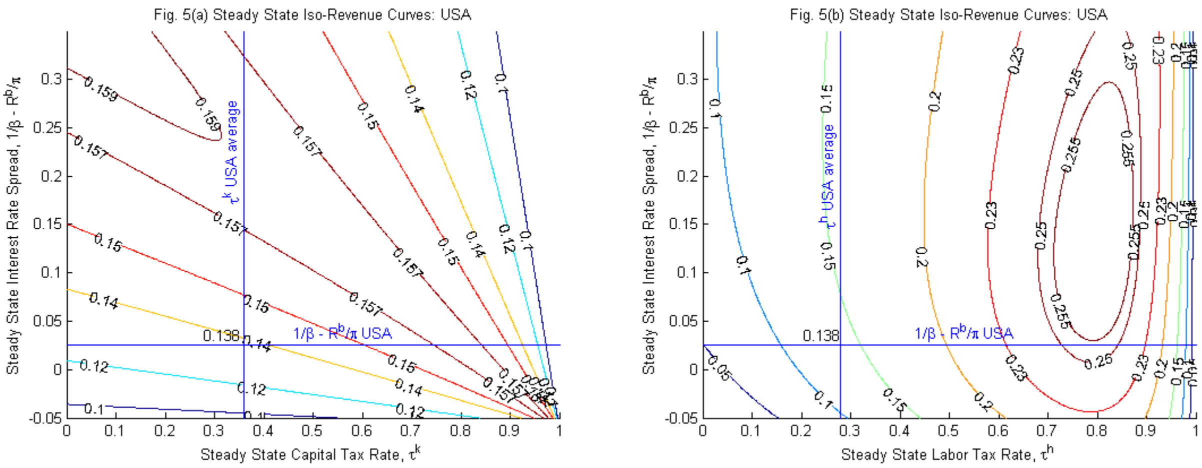

Fig. 5. Laffer hills for financial repression revenue and capital and labor taxes

Kanat S. Isakov

National Research University Higher School of Economics. Laboratory for Macroeconomic Analysis, Assistant Junior Research Fellow; E-mail: kisakov@hse.ru

Any opinions or claims contained in this Working Paper do not necessarily reflect the views of HSE