



Institut für Makroökonomie  
und Konjunkturforschung  
Macroeconomic Policy Institute

# Working Paper

8/2010

---

## **The Simple Macroeconomics of Fiscal Austerity, Public Sector Debt and Deflation**

**Thomas I. Palley**

May 2010

---

Hans-Böckler-Straße 39  
D-40476 Düsseldorf  
Germany  
Phone: +49-211-7778-331  
IMK@boeckler.de  
<http://www.imk-boeckler.de>

**Hans Böckler  
Stiftung**

Fakten für eine faire Arbeitswelt.

# **The Simple Macroeconomics of Fiscal Austerity, Public Sector Debt and Deflation**

## **Abstract**

This paper explores the macroeconomics of fiscal austerity and deflation in an economy with public debt. A binding budget deficit cap destabilizes the economy by turning the government budget into an automatic destabilizer. Public debt helps maintain AD in the presence of deflation because deflation increases the real value of public interest payments. That makes public debt significantly different from private debt. If the economy is subject to a binding deficit cap, deflation no longer stabilizes output. This is because increased real interest payments must be matched by spending cuts, giving rise to a negative balanced budget multiplier.

Keywords: fiscal austerity, budget deficit cap, public debt, deflation.  
JEL ref.: E12, E60, E62, H62.

Thomas I. Palley  
New America Foundation  
Washington DC  
E-mail: [mail@thomaspalley.com](mailto:mail@thomaspalley.com)

May 2010

## **I Introduction**

The past two years has seen much attention focused on the issue of private sector debt. Private sector over-leveraging and disregard of risk by borrowers and lenders are widely viewed as being critical ingredients in the making of the Great Recession. Together, they fuelled the U.S. house price bubble and created balance-sheet fragility in both the household and financial sectors. As part of the aftermath, excessive debt poses the potential danger of Fisher (1933) styled debt deflation whereby a falling price level raises debt burdens, triggering bankruptcies and aggregate demand (AD) destruction that worsens the problem of falling prices.

There are now indications the economic crisis may be moving toward a second stage in which excessive public sector debt becomes the perceived problem. Many governments have engaged in bond financed expansionary fiscal policy and financial sector bailouts, which has created large deficits and increased public sector debt. This problem is most acutely visible in Europe with the problems of the so-called PIIGS – Portugal, Italy, Ireland, Greece and Spain. These countries have large fiscal deficits measured as a percent of GDP and large public debt to GDP ratios. In the U.S. the problem is evident at the state budget level. However, there are also growing fears about the federal debt given persistent deficits that are large by historical standards and projected large future outlays on Medicare, Medicaid, and Social Security.

This concern with public debt is driving a second stage crisis agenda of fiscal austerity. That agenda includes proposals for cutting government spending and imposing rules that limit budget deficits as a share of GDP. The current paper examines the macroeconomics of fiscal austerity within a simple Keynesian framework. It shows how

fiscal austerity works and why it is likely to be counter-productive. Deficit ceilings are especially problematic as they prevent the budget deficit from performing its automatic stabilizer role and turn the deficit into an automatic destabilizer.

The paper also looks at the issue of public sector debt and deflation. It turns out that deflation increases AD in the presence of public debt. Public debt therefore has the opposite effect of private debt and is a stabilizer in the presence of deflation. However, if policy imposes a budget deficit cap, public sector debt becomes a destabilizing force. This has clear policy implications in both the U.S. and Europe where deflation remains a threat and there are strong political forces looking to impose rules that limit the budget deficit as a share of GDP.

## **II The model economy**

The economy is described in terms of a Keynes – Kalecki model. The Keynesian dimension is demand determined equilibrium. The Kaleckian dimension is AD depends on the functional distribution of income

The production and pricing side of the economy is as follows

$$(1) Y = aN \quad a > 0$$

$$(2) p = [1 + m]w/a \quad m > 0$$

$$(3) w/p = a/[1 + m]$$

$$(4) Y = E$$

$Y$  = real output,  $a$  = average product of labor,  $N$  = employment,  $p$  = price level,  $m$  = firms' mark-up,  $w$  = nominal wage, and  $E$  = real aggregate demand. Equation (1) is a linear production function. Equation (2) is the pricing rule whereby firms set prices as a

mark-up over unit labor costs. Equation (3) determines the real wage. Equation (4) is firms' production rule under which firms produce to demand.

The demand side of the economy is as follows

$$(5) Y = C + S + T$$

$$(6) E = C + I + G$$

$$(7) C = \beta[1 - t_w]W + \alpha[1 - t_\pi]\{\Pi + iD\} \quad 1 > \beta > \alpha > 0$$

$$(8) W = \theta Y \quad 0 < \theta < 1$$

$$(9) \Pi = [1 - \theta]Y$$

$$(10) B = T - G$$

$$(11) T = t_w W + t_\pi[\Pi + iD] - iD$$

$C$  = consumption spending,  $S$  = aggregate saving,  $T$  = total tax revenues,  $I$  = investment spending,  $G$  = government spending,  $\beta$  = propensity to consume out of wage income,  $\alpha$  = propensity to consume out of profit and interest income,  $t_w$  = tax rate on wage income,  $t_\pi$  = tax rate on profit and interest income,  $\theta$  = wage share of national income,  $W$  = wage bill,  $\Pi$  = profit income,  $i$  = nominal interest rate,  $D$  = public sector debt, and  $B$  = budget deficit.

Equation (5) is the definition of national income. Equation (6) is the definition of AD in a closed economy. Equation (7) determines aggregate consumption. It embodies a Kaleckian structure in that the propensity to consume out of after-tax wage income ( $\beta$ ) is greater than propensity to consume out of after-tax profit and interest income ( $\alpha$ ). The microeconomic rationale for this aggregate pattern is that profit income accrues disproportionately to well-off households who have a lower propensity to consume (Palley, 2010). Investment and government spending are exogenously determined.

Equation (8) determines the wage share, while equation (9) determines the profit share. Equation (10) defines the budget deficit or surplus. Equation (11) determines total tax revenues which consist of taxes on wages, profits and interest income, less interest payments on the public debt that are a transfer payment.

Using equations (4), (5) and (6) yields the goods market equilibrium condition

$$(12) I - S = T - G$$

This is a restatement of the familiar Keynesian condition that leakages out of the circular flow of income equal injections. The left hand side of equation (12) is a measure of private sector net saving; the right hand side is a measure of public sector saving. This relationship between aggregate net private saving and aggregate public saving was emphasized long ago by Tobin (1963). For every lender (saver) there must be a borrower (dis-saver). If the private sector wants to run a net surplus (i.e.  $S > I$ ), the public sector must run a deficit (i.e.  $G > T$ ). Correspondingly, if the private sector wants to invest more than it saves ( $I > S$ ), the public sector must run a surplus ( $T > G$ ) and lend to the private sector. It does so by redeeming public debt. This relationship has also been emphasized by Godley and Zezza (2006).<sup>1</sup>

Substituting into equation (12) yields

$$(13) I - [1 - \beta][1 - t_w]\theta Y - [1 - \alpha][1 - t_\pi]\{[1 - \theta]Y + iD\} = t_w\theta Y + t_\pi[\theta Y + iD] - iD - G$$

Equation (13) is shown in Figure 1. Public sector saving is represented by the budget outcome ( $S_{PUB} = T - G$ ) which is a positive function of income. Net private sector saving ( $S_{PRIV} = I - S$ ) is a negative function of income. The economy is in equilibrium when net private sector saving equals public sector saving. Figure 1 depicts a situation in which the

---

<sup>1</sup> In an open economy the trade balance provides an additional vent for private sector saving and  $S_{PRIV} = I - S + X - M$ . The private sector can increase its saving in the form of exports.

private sector lends (i.e. has positive net saving) while the public sector borrows (i.e. has a budget deficit and negative net saving), which has been the usual outcome.

< Insert Figure 1 here >

Recessions can be thought of as shocks to private sector demand that increase private sector net saving. In the current model this is most easily represented as a reduction of investment spending (I) which shifts the  $S_{\text{PRIV}}$  schedule down, resulting in a new equilibrium with lower income.

The effect on income of a shock to demand depends critically on the slope of the public sector saving schedule ( $S_{\text{PUB}} = T - G$ ). The flatter this schedule, the larger the fall in income. The slope of the schedule is

$$d[T - G]/dY = t_w\theta + t_\pi[1 - \theta] > 0$$

The critical parameters are tax rates and the distribution of income. Higher tax rates steepen the schedule and reduce the impact of private sector demand shock. This reflects the counter-cyclical nature of income taxes. Thus, as AD and income increases in expansions, the tax-take increases thereby limiting the expansion of AD and income. The reverse happens in contractions. Positive demand shocks that decrease private sector net saving ( $I - S$ ) are offset by increases in public saving ( $T - G$ ). A system of perfect automatic stabilizers would have the  $S_{\text{PUB}}$  schedule vertical.

### **III The economics of fiscal austerity**

The above model can be used to analyze the economics of fiscal austerity that is now being proposed in response to growing public sector debt concerns.

#### ***Budget deficit caps***

One austerity proposal is to impose budget deficit caps that limit the deficit as a share of GDP. This proposal can be represented as follows

$$(14) B = \text{Max}[T - G, -\psi Y]$$

$B$  = budget deficit or surplus. Equation (14) limits the deficit to a maximum of  $\psi Y$ . This budget cap is represented in Figure 2 by the negatively sloped ray from the origin and it constrains the actual budget outcome to lie on or above the ray.

< Insert Figure 2 here >

Given existing settings for fiscal policy, the budget outcome must lie on the bold faced V - shaped schedule consisting of that part of the budget deficit cap line above the public sector saving schedule and that part of the public sector saving schedule above the budget deficit cap line. When the budget deficit cap is binding the deficit is constrained to lie on the budget deficit cap line.

A binding deficit cap transforms the budget deficit from an automatic stabilizer into an automatic destabilizer. Thus, a negative demand shock that reduces investment shifts the  $S_{\text{PRIV}}$  schedule left, obliging policy to respond by tightening fiscal policy, which amplifies the initial shock. The reason is the demand shock lowers income and tax revenues, thereby worsening the budget deficit. To satisfy the deficit cap, policy must either increase taxes or lower spending.

The extent to which cap acts as an automatic destabilizer depends on the magnitude of the coefficient  $\psi$  which represents the deficit - GDP ratio. A smaller ratio makes the cap more binding and flattens the budget deficit constraint in Figure 2. That makes the budget even more pro-cyclical.



This outcome is illustrated in Figure 3. The initial equilibrium is given by the intersection of  $S_{PRIV0}$  and  $S_{PUB}$ . A negative shock to private investment shifts net private sector saving to  $S_{PRIV1}$  so that it now intersects the budget deficit cap line at  $Y_1$ . Without the cap the new equilibrium would be at the intersection of  $S_{PRIV1}$  and  $S_{PUB}$ . With the cap the new equilibrium is at the intersection of  $S_{PRIV1}$  and the budget deficit cap line. Government is therefore compelled to raise taxes and lower spending in some combination that shifts the  $S_{PUB}$  schedule to the left such that it intersects budget the deficit cap line at  $Y_1$ .

< Insert Figure 3 here >

### ***Spending versus tax austerity***

A second issue concerns the austerity mix regarding raising taxes versus cutting spending. Both types of measure reduce AD and income but government spending cuts are more contractionary. To see this consider three options: cutting spending by one dollar; raising the wage tax to increase tax revenues by one dollar; and raising the profit tax to increase tax revenues by one dollar.

It can then be shown that the effect on equilibrium output is

$$dY/dG = -1/m$$

$$dY/dT = \delta Y / \delta t_w \cdot dt_w / dT = -\beta/m$$

$$dY/dT = \delta Y / \delta t_{\pi} \cdot \delta t_{\pi} / \delta T = -\alpha/m$$

$$m = \{1 - \beta[1 - t_w]\theta - \alpha[1 - t_{\pi}][1 - \theta]\}$$

$$-1/m < -\beta/m < \alpha/m$$

The most contractionary form of fiscal austerity is to cut spending. The least contractionary form is to raise taxes on profit income. The logic is richer households have

a higher propensity to save. *Ergo*, taxing income streams that disproportionately accrue to such households has the smallest income on AD.

This Keynesian logic recommends that if fiscal austerity is politically required at a time of demand shortage, it should be implemented by progressive measures. The problem is this runs counter to the myth of a saving shortage that has been so assiduously pushed the past two decades to explain trade deficits and weak investment performance. That myth promotes reverse thinking and justifies policies which protect the incomes of richer households on the grounds they are high savers, and it also promotes cutting government spending on the grounds that doing so increases public saving. The net result is the saving shortage myth promotes the worst type of fiscal austerity policies that cause the largest demand contraction at a time of AD shortage.

#### **IV Public sector debt and deflation**

The depth of the Great Recession has opened the possibility of deflation. The interaction between deflation and debt has been analyzed extensively with regard to private debt (Palley, 1999, 2008a, 2008b) but the interaction with public debt is less well appreciated. It transpires public debt helps stabilize an economy in the presence of deflation but that stabilizing mechanism can be undermined by the imposition of budget deficit caps.

The real level of public debt is given by

$$(15) D = D/p$$

$D$  = nominal debt. The equilibrium level of income is given by

$$(16) Y = \{I + G + \alpha[1 - t_{\Pi}]iD/p\}/m$$

$m = \{1 - \beta[1 - t_w]\theta - \alpha[1 - t_\pi][1 - \theta]\}$ . Now, consider a situation in which the price level and nominal wages fall proportionately so the real wage is unchanged. Differentiating (16) with respect to the price level ( $p$ ) yields

$$dY/dp = -\alpha[1 - t_\pi]iD/mp^2 < 0$$

A decrease in the price level increases real output. The reason is a lower price level increases the real value of interest payments on public debt, which increases AD and income. Unlike private inside debt, deflation is expansionary with regard to public debt.

This expansionary interaction between deflation and public debt results from deflation automatically increasing the real budget deficit. The deficit is given by

$$(17) B = T - G = t_w\theta Y + t_\pi\{[1 - \theta]Y - iD/p\} - iD/p - G$$

Differentiating with respect to  $p$  yields

$$dB/dp = \delta T/\delta Y \cdot \delta Y/\delta p + iD/p^2 > 0 \text{ if } 1 > t_w \text{ and } 1 > t_\pi$$

The proof of this condition is provided in the appendix.<sup>2</sup> A higher price level pushes the budget toward surplus while a lower price level contributes to a deficit. The reason is a lower price level increases the real value of interest outlays. Though that stimulates AD and increases tax revenues, the increase in outlays exceeds the induced increase in revenues.

Now, suppose the budget is subject to a binding deficit cap. In this case the economy is described by two equations given by

$$(18) Y = \{I + G + \alpha[1 - t_\pi]iD/p\}/m$$

---

<sup>2</sup> The economic logic of the condition is the same as in the standard income-expenditure model. In that model increased government spending cannot lower the deficit if the tax rate is less than one hundred percent, and that condition is needed for stability. A similar condition holds in the current model, but now it is that both tax rates must be less than one hundred percent. If this condition did not hold it implies government can reduce the budget deficit by increasing real interest payments to the owners of the national debt.

$$(19) - \psi Y = t_w \theta Y + t_\pi \{ [1 - \theta] Y + iD/p \} - iD/p - G$$

Equation (18) determines income and equation (19) is the budget deficit constraint. Additionally, suppose the cap is enforced by adjusting  $G$ . In this case, the endogenous variables are  $Y$  and  $G$ . Differentiating equations (18) and (19) with respect to  $Y$ ,  $G$  and  $p$ , and arranging in matrix form yields

$$(18) Y = \{ I + G + \alpha [1 - t_\pi] iD/p \} / m$$

$$(19) - \psi Y = t_w \theta Y + t_\pi \{ [1 - \theta] Y + iD/p \} - iD/p - G$$

$$\begin{vmatrix} 1 & -1/m \\ -\{\psi + t_w \theta + t_\pi [1 - \theta]\} & 1 \end{vmatrix} \begin{vmatrix} dY \\ dG \end{vmatrix} = \begin{vmatrix} -\alpha [1 - t_\pi] iD / m p^2 \\ [1 - t_\pi] iD / p^2 \end{vmatrix} dp$$

$$\begin{vmatrix} 1 & -1/m \\ -\{\psi + t_w \theta + t_\pi [1 - \theta]\} & 1 \end{vmatrix} \begin{vmatrix} dY \\ dG \end{vmatrix} = \begin{vmatrix} -\alpha [1 - t_\pi] iD / m p^2 \\ [1 - t_\pi] iD / p^2 \end{vmatrix} dp$$

The Jacobian is given by  $|J| = 1 - \{\psi + t_w \theta + t_\pi [1 - \theta]\} / m$ . For all reasonable parameter values the Jacobian is positive. For example, if  $\psi = 0.03$ ,  $t_w = 0.2$ ,  $t_\pi = 0.4$ ,  $\theta = 0.67$ , and  $m = 0.5$ , then  $|J| = 0.41$ . The effect of a higher price level on income and government spending is then given by

$$dY/dp = [1 - \alpha] [1 - t_\pi] iD / m p^2 |J| > 0$$

$$dG/dp = [1 - \alpha] [1 - t_\pi] iD / m p^2 |J| > 0$$

A higher price level increases income and government spending, and a lower price level lowers them. Moreover, they change by the same amount.

The logic is a lower price level increases interest transfer outlays. To satisfy the budget deficit cap spending is cut by an equal amount. That gives rise to a negative balanced budget multiplier that reduces income by the size of the reduction in spending.

## V Conclusion

This paper has explored the macroeconomics of fiscal austerity and the effect of deflation in a simple Keynesian model with public debt. There are three key findings.

First, imposing a binding budget deficit cap destabilizes the economy in the sense of turning the government budget from an automatic stabilizer into an automatic destabilizer. Second, a large public debt helps maintain AD in the presence of deflation, making public debt significantly different from private debt. Deflation increases the real value of public interest payments which increases AD. Third, if the economy is subject to a binding budget deficit cap, deflation no longer stabilizes output. This is because the increase in real interest payments must be matched by a cut in spending, giving rise to a negative balanced budget multiplier.

## Appendix

The proof of the inequality condition showing that deflation in the presence of public debt increases the deficit is as follows. The deficit is given by

$$(A.1) \quad B = T - G = t_w \theta Y + t_{\pi} \{ [1 - \theta] Y - iD/p \} - iD/p - G$$

Differentiating with respect to  $p$  yields

$$\begin{aligned} dB/dp &= \delta T / \delta Y \cdot \delta Y / \delta p + iD/p^2 \\ &= - \{ t_w \theta + t_{\pi} [1 - \theta] \} \alpha [1 - t_{\pi}] iD/mp^2 + iD/p^2 \end{aligned}$$

$$m = \{ 1 - \beta [1 - t_w] \theta - \alpha [1 - t_{\pi}] [1 - \theta] \}$$

To show  $dB/dp > 0$  substitute for  $m$ , simplify, and rearrange to yield the inequality

$$(A.2) \quad \{ 1 - \beta [1 - t_w] \theta - \alpha [1 - t_{\pi}] [1 - \theta] \} > \{ t_w \theta + t_{\pi} [1 - \theta] \} \alpha [1 - t_{\pi}]$$

The term  $\alpha [1 - t_{\pi}]$  is less than one. Setting  $\alpha [1 - t_{\pi}]$  equal to one increases the value of the left hand side, yet it can still be shown the inequality holds under this more stringent condition. Consequently, it must also hold when  $\alpha [1 - t_{\pi}] < 1$ .

Set  $\alpha [1 - t_{\pi}] = 1$  and divide inequality (A.2) into two inequalities given by

$$(A.3) \quad \theta - \beta [1 - t_w] \theta > t_w \theta$$

$$(A.4) \quad [1 - \theta] - \alpha [1 - t_{\pi}] [1 - \theta] > t_{\pi} [1 - \theta]$$

It is then simple to show that inequality (A.3) holds if  $1 > t_w$  and inequality (A.4) holds if  $1 > t_{\pi}$ . Since (A.3) and (A.4) are satisfied by assumption, then (A.2) is also satisfied.

## References

Fisher, I., "The Debt - Deflation Theory of Great Depressions," *Econometrica*, 1 (October 1933), 337-57.

Godley, W., and Zezza, G., "Debt and Lending: A cri de Coeur," Policy Note 4, The Levy Economics Institute of Bard College, Annandale-on-Hudson, New York, 2006.

Palley, T.I, "General Disequilibrium Analysis with Inside Debt," *Journal of Macroeconomics*, 21 (Fall 1999), 785 - 804.

-----, "The Macroeconomics of Aggregate Demand and the Price Level," *Investigacion Economica*, LXVII (2008a), 49-66.

-----, "Keynesian Models of Deflation and Depression Revisited," *Journal of Economic Behavior and Organization*, 68 (October 2008b), 167 - 77.

-----, "The Relative Permanent Income Theory of Consumption: A Synthetic Keynes-Duesenberry-Friedman Model," *Review of Political Economy*, 1 (January 2010), 41 – 56.

Tobin. J., "Deficit, Deficit, Who's got the Deficit?" *The New Republic*, January 19, 1963.

Figure 1. The relationship between private sector net saving and the public sector balance.

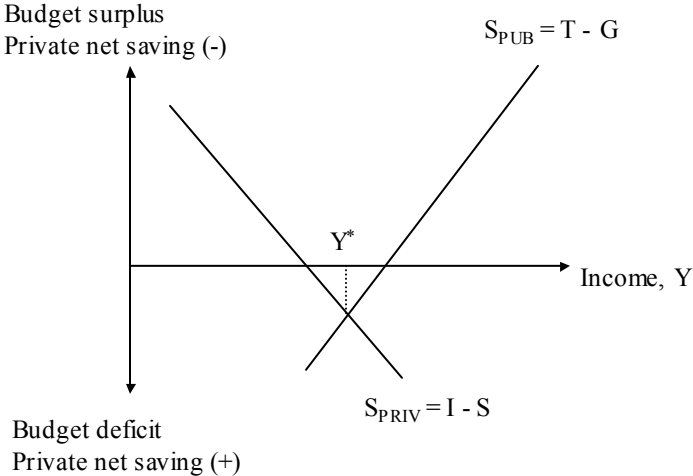


Figure 2. The effect of a budget deficit cap.

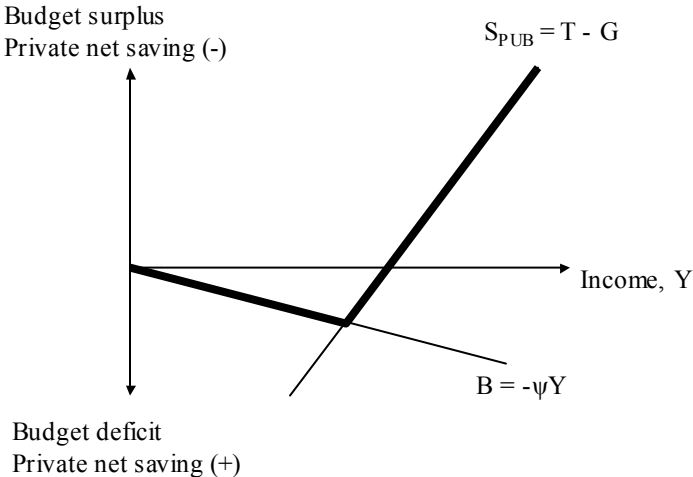
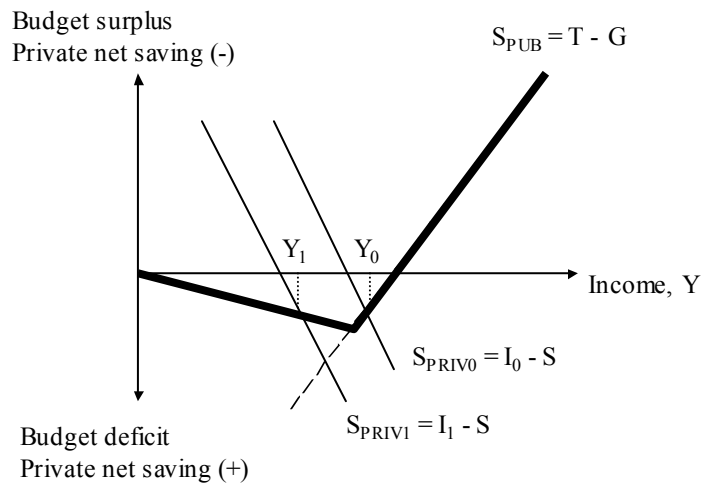




Figure 3. The effect of a negative demand shock in the presence of a binding budget deficit cap.



---

**Publisher:** Hans-Böckler-Stiftung, Hans-Böckler-Str. 39, 40476 Düsseldorf, Germany

**Phone:** +49-211-7778-331, [IMK@boeckler.de](mailto:IMK@boeckler.de), <http://www.imk-boeckler.de>

**IMK Working Paper is an online publication series available at:**

<http://www.boeckler.de/cps/rde/xchg/hbs/hs.xls/31939.html>

**ISSN:** 1861-2199

The views expressed in this paper do not necessarily reflect those of the IMK or the Hans-Böckler-Foundation.

All rights reserved. Reproduction for educational and non-commercial purposes is permitted provided that the source is acknowledged.

**Hans Böckler  
Stiftung** 

Fakten für eine faire Arbeitswelt.

---