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**Negative Welfare Effects from Enhanced International M&As
in the Post-BREXIT-Referendum UK**

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Summary

Summary: The disintegration of a regional integration group raises many questions, including some which relate to welfare aspects. As regards the UK's leaving of the EU (BREXIT), many studies have considered the effect on real gross domestic product (GDP), but thus far no papers have studied the effects on real gross national product and the maximum long-term per capita consumption. As regards these important questions one may consider an enhanced neoclassical growth model with foreign direct investment that allows to capture the main effect from higher post-BREXIT mergers & acquisitions; namely that an increasing number of foreign investors will take over more British banks and firms. The theoretical link picks up the basic insights of the FROOT/STEIN model (QJE, 1991) which says that a real depreciation of the currency brings about higher international mergers and acquisitions in the country with the depreciation. Thus the UK should anticipate a higher share of foreign capital ownership and effectively a worsening of the terms of capital in the future. The model presented shows that the golden age per capita consumption in the UK is reduced by BREXIT. This is an additional negative effect beyond the anticipated 10 percent GDP loss emphasized in the Treasury Study (2016) on the long-term effects of British EU membership.

Zusammenfassung

Zusammenfassung: Eine regionale Disintegration wirft viele Fragen auf, inklusive der Fragen, die sich auf Wohlfahrtsaspekte beziehen. Viele Studien haben für den Fall des BREXIT die Auswirkungen auf das Bruttoinlandsprodukt untersucht, jedoch gibt es bisher keine Studien zu den Auswirkungen der Veränderungen des realen Bruttosozialprodukts oder Studien die den maximalen langfristigen Pro-Kopf-Verbrauch untersuchen. In Bezug auf diese wichtigen Fragen, kann ein verbessertes neoklassisches Wachstumsmodell mit ausländischen Direktinvestitionen betrachtet werden, welches auch die höheren post-BREXIT Mergers & Acquisitions erfasst, da eine wachsende Zahl von ausländischen Investoren mehr britische Banken und Firmen übernehmen wird. Die theoretische Verknüpfung greift die grundlegenden Einsichten des FROOT/STEIN Modells (QJE, 1991) auf, welches besagt, dass eine reale Abwertung der Währung höhere Internationale Mergers & Acquisitions im Land mit sich bringt. So kann für das Vereinigte Königreich ein höherer Anteil an ausländischen Kapitalbesitz und eine Verschlechterung der Kapitalausstattung erwartet werden. Das vorgestellte Modell zeigt, dass das goldene Zeitalter des Pro Kopf Konsums in Großbritannien durch den BREXIT zurück geht. Dies ist ein zusätzlicher negativer Effekt über den 10%igen BIP-Rückgang hinaus, der in der Treasury Studie (2016) für die langfristigen Auswirkungen der britischen EU-Mitgliedschaft hervorgehoben wurde.

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1. Introduction

With the United Kingdom heading towards an exit from the European Union on the basis of the June 23rd, 2016, referendum – which resulted in a 51.9 percent majority in favor of BREXIT – there are several questions remaining to be answer including two important economic ones:

- What is the main economic effect of BREXIT on real gross domestic product (Y) in the UK in the long run? Here a key answer is found in the Cameron government’s study of the Treasury (HM TREASURY, 2016) that suggests, based on a medium scenario regarding future UK access to the EU single market – i.e. assuming the concluding of a special EU-UK Free Trade Agreement – that there will be a long-run output loss of 10 percent; namely roughly 6 percent from a lower GDP over an extended adjustment period where the comparison is relative to the baseline scenario of a continued UK membership in the EU; another -4 percent stems from the non-realized benefits of participation in a deepening of the EU single market as had been negotiated between the Cameron government and the European Commission in early 2016.
- What additional welfare effects have to be considered on the basis that BREXIT will affect real national income (Z) which in a simple analytical setting requires to consider changes in foreign ownership in the UK’s capital stock after the 2016 referendum; in this context the definition that $Z = Y$ plus [*net income from abroad*] could be simply interpreted as Z having a negative squared bracket term which stands for profits accruing abroad, namely from the foreign subsidiaries in the UK to the respective parent company abroad. In a broader context with both cumulated foreign direct investment (FDI) inflows as well as cumulated outward FDI, the analysis is slightly more complex. It should be noted that so far there is no analysis of the wealth effects and the associated welfare effects in the context of BREXIT.

It is useful to first take a look at the simple setting where the question is how BREXIT and the associated massive real depreciation of the Pound will affect the share of foreign ownership in the UK capital stock and hence real income in the long run – the perspective on real income is, of course, different from the GDP perspective. *A fortiori* one can then ask about the implications for the golden rule- that is the condition that maximizes long run per capita consumption in a growth model with cumulated inward FDI and with real consumption being proportionate not to GDP but to disposable national real income. The strong real depreciation that is most likely to occur – not least due to lower future export growth of the UK to EU27 markets (with the UK having to comply with rules of origin in expected future sectoral EU-UK free trade agreements in the context of BREXIT) while EU27 export growth to UK markets will hardly be impaired by constraints related to rules of origin; the rules of origin that typically require 60 percent of national/EU value-added are asymmetrical in favor of the EU27 by the simple fact that it is the UK that will leave the European Union. In the end, it will be argued that BREXIT will bring about a high real devaluation which amounts, in an imperfect capital market approach, to facilitating foreign investors to acquire British firms – effectively at a discount: A real devaluation in a context of open economies with foreign direct investment implies that the “terms of capital” of the countries with an appreciating currency (in real terms) are improved. By implication there is a negative effect on real GNP development in the UK since a higher share of capital

owned by foreigners in a post-BREXIT future implies that net income from abroad accruing to the UK will be diminished and hence the maximum steady state per capita consumption will be reduced in the UK.

The following analysis is straightforward: Firstly, one has to look at an adequately modified neoclassical growth model, namely an approach with foreign direct investment inflows (and possibly, in an extended model, also with FDI outflows). The implication for the golden rule has to be analyzed and then policy options can be considered.

2. A Modified Neoclassical Growth Model: Focus on Foreign

Direct Investment

BREXIT will be accompanied by a strong real devaluation of the Pound, which in turn means more direct investment inflows and increased mergers and acquisitions in the UK (WELFENS, 2017a). From a theoretical perspective, the argumentation and empirical modeling of FROOT/STEIN (1991) which examine imperfect capital markets play a critical role despite being focused on the US. The devaluation raises the units of the depreciating currency calculated in terms of the equity of foreign bidders, which improves their chances of success with regard to acquiring shareholdings and takeovers in a leveraged M&A situation.

To estimate the effects of a raised share of foreign investors in terms of the British capital stock as a result of the BREXIT referendum, one can consider a simple extended version of the Solow growth model; the extension relates to an asymmetrical integration of direct investment, where, for reasons of simplicity, only cumulated direct investment inflows are considered. To achieve long-term growth equilibrium, per capita savings S/L must equal per capita gross investment $(dK/dt)/L + \delta K/L$ (where S is savings, K is the capital stock, t the time index, δ the depreciation rate of real capital and L is the population or labor).

A standard macroeconomic production function could be expressed as follows (with $0 < \beta < 1$):

$$1) Y = K^\beta L^{1-\beta}$$

Assuming competition in goods and factor markets, such that the share of capital income is β , in the steady state (with $\#$ the long-term equilibrium and τ the income tax rate) one can now say (with $k := K/L$ and assuming that Savings $S = s(1-\tau)Y$ and that the growth rate of L is constant):

$$2) k^\# = [s(1-\tau)/(n+\delta)]^{1/(1-\beta)}$$

If, in a modified approach, foreign investors have a share α^* of the domestic capital stock – initially, disregarding direct investment from country 1 in country 2 (i.e. abroad) – then $S = s(1-\tau)Y(1-\alpha^*\beta)$, as savings are proportional to the disposable net national income (net meaning after taxes); if one was to assume a reinvestment ratio s' on the part of foreign investors, then $S = s(1-\tau)Y(1-\alpha^*\beta) + \alpha^*\beta s'(1-\tau)Y = s(1-\tau)Y + \alpha^*\beta(1-\tau)Y(s'-s)$ and the corresponding steady-state solution for capital intensity $k^\#$ is:

$$2.1) k^\# = [s(1-\tau) + \alpha^*\beta(1-\tau)(s'-s) / (n+\delta)]^{1/(1-\beta)}$$

$$2.2) y^{\#} = [s(1-\tau) + \alpha^*\beta(1-\tau)(s'-s)/(n+\delta)]^{\beta/(1-\beta)}$$

If $s' > s$, the long-term capital intensity and thus the long-term per capita income is $y^{\#} = k^{\#\beta}$ higher with the presence of foreign investors than in a closed economy without (cumulated) direct investment inflows. Moreover, as in a more realistic specification the effective tax rate on the profits of foreign subsidiaries is lower than on domestic firms, this could eventually result in $k^{\#}$ (if one also considers technological knowledge in the production function – with Harrod-neutral technological progress – then it can also be considered that the growth rate of knowledge $a = a' + a'\alpha^*$, which can be seen if one applies a production function $Y = K^{\beta}(AL)^{1-\beta}$ in an amended steady-state condition for $K/(AL) =: k^{\#}$, i.e. for $y^{\#} := Y/(AL)$; A is the level of knowledge. It is conceivable that direct investors raise the level of the growth path in the steady-state as well as the long-term trend growth rate (a) of per capita income; or the level sinks while the trend growth rate of per capita income rises.

The maximum long-term per capita consumption in an economy with direct investment arises from the Income-Expenditure equation of private households (with C for real consumption, S for real gross savings, α^* for the share of foreign owners of the capital stock, β the share of capital income in gross domestic product). In the steady-state and long-term equilibrium – initially without technological progress – it must be that the per capita consumption equals per capita gross national income minus per capita steady-state savings $S^{\#}/L$ (and this is $(n+\delta)k$) is:

$$3) C^{\#}/L = (1-\alpha^*\beta)y - S^{\#}/L$$

For per capita savings in the steady-state, i.e. in long-term equilibrium, it holds in the growth model (with n for an exogenous population growth rate) that $S/L = (n+\delta)k$ and thus one can (with $y := Y/L$) write the equation, taking $y = k^{\beta}$ into consideration, as:

$$4) C^{\#}/L = (1-\alpha^*\beta)k^{\#\beta} - (n+\delta)k^{\#}$$

If one differentiates $C^{\#}/L$ with respect to $k^{\#}$ in order to maximize per capita consumption (“golden age consumption”) in the long-term equilibrium and sets the outcome equal to zero, then one can see:

$$5) \beta(1-\alpha^*\beta)k^{\#\beta-1} = (n+\delta)k^{\#}$$

Thus the so-called golden rule capital intensity, which maximizes long-term per capita consumption, is:

$$6) k^{\text{gold}\#} = [\beta(1-\alpha^*\beta)/(n+\delta)]^{1/(1-\beta)}$$

With direct investment, the golden rule capital intensity in the country is lower would otherwise be the case and thus also the long-term per capita income.

$$7) y^{\text{gold}\#} = [\beta(1-\alpha^*\beta)/(n+\delta)]^{\beta/(1-\beta)}$$

These findings are independent of how one specifies the savings function, i.e. if $s' > s$; however, this condition is important insofar as it is only with knowledge of this condition that government can set the income tax at a rate at which golden rule capital intensity can be realized. If one follows the logic of the FROOT/STEIN (1991) approach, then the share α^* of the British capital stock owned by foreign investors is a positive function of the real exchange.

Technological Progress

If one considers a production function with labor multiplying knowledge $Y = K^\beta (AL)^{1-\beta}$ and assumes an exogenous growth rate of technological knowledge (A), the golden age capital intensity $k^{\#}$ (with $k^{\#} := K/(AL)$) will be:

$$8) k^{\# \text{ gold}} = [\beta(1-\alpha^*\beta)/(a+n+\delta)]^{1/(1-\beta)}$$

A question, which is reasonable to pose at this point, is how a is influenced by the presence of foreign investors; here, an implicit knowledge production function $a = a' + a''\alpha^*$ is assumed (with $a'' > 0$, $a' > 0$, where a' is the exogenous rate of progress), such that a new equation for golden age capital intensity (with the non-depreciation rate $\delta := 1 - \delta'$):

$$9) k^{\# \text{ gold}} = [(1-\alpha^*\beta)\beta / (a' + a''\alpha^* + n + 1 - \delta')]^{1/(1-\beta)}$$

Assuming that $\alpha^*\beta$ and $a' + a''\alpha^* + n - \delta'$ are close to zero, then one can calculate an analytical solution for $\ln k^{\# \text{ gold}} / d\alpha^*$ taking the log of the equation:

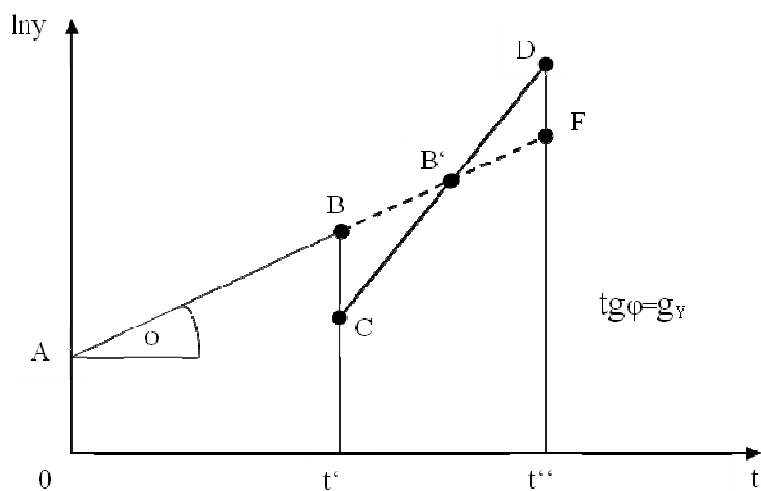
$$10) \ln k^{\# \text{ gold}} = (-\alpha^*(\beta + a'') + \ln \beta - a' - n + \delta') / (1-\beta)$$

The level of the growth path of the capital stock is thus negatively dependent on α^* , but the growth rate of per capita income is positively dependent on α^* . The higher the share of the capital stock which is in the hands of foreign investors – from technologically-leading countries-, the larger the parameter a'' . Whether, from an economic perspective or from the perspective of policy-makers, respectively, it is worth raising α^* , i.e. whether there will be an associated raising of per capita income or an increase in utility in general, depends on the discounting of the gains in growth by raising α^* and the length of the time horizon of the voter in a democracy: the discounted increase in income or utility, respectively, must be sufficient to compensate for the fall in the level of the growth as a result of raising α^* . Only empirical studies will be able to determine if this is indeed the case. It should also be considered what sectoral structure the direct investment inflows have – empirical analyses for the United Kingdom have shown that direct investment inflows in manufacturing industries raise technological knowledge and thus total factor productivity, while inflows in the financial sector show no such effect.

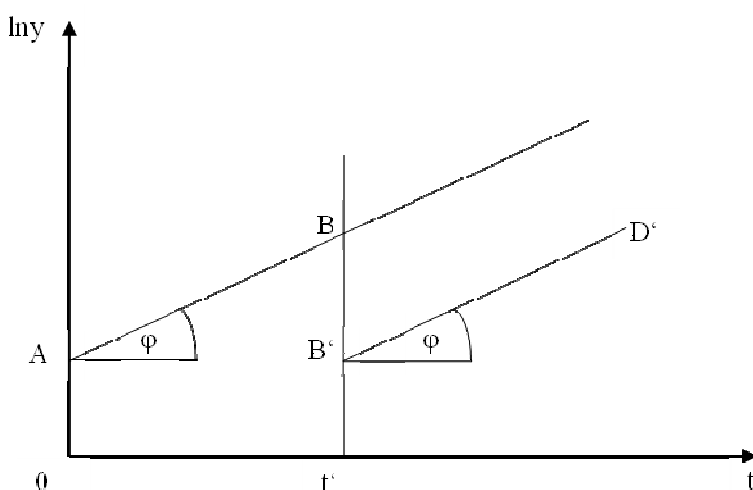
Figure 1. shows the original growth path for $\ln y$, where to a certain point in time t' the raising of α^* (raising of the share of foreign investors in the capital stock K) takes place: the level of the growth path sinks, but in (a) the trend growth rate increases (the curve in the $\ln y$ - t diagram will be steeper). From time t'' , the (discounted) rise of per capita income over-compensates for the initial decline in per capita income. The case is also possible (see (b)), in which α^* increases, while the trend growth remains unchanged. If the rise of the share of foreign investors in K is due to investment from technologically less advanced OECD countries, then $a'' = 0$, which results in the aforementioned outcome.

Figure 1: Level of the Growth Path (OA) and Trend Growth Rate (tgφ)

(a) Trend Growth Rate Rises



(a) Trend Growth Rate Unchanged ($a'' = 0$)



Open Economy with Trade and Direct Investment

Other extensions arise, when one considers (WELFENS, 2011; WELFENS, 2017b) that consumption and savings, respectively, are not dependent on the gross domestic product Y , but are instead proportional to gross national income. As the domestic profit share, amounts to – with a production function $Y^* = K^{*\beta^*} (A^*L^*)^{1-\beta^*}$ and assuming competition on the goods and factor markets – amounts to $-\beta^*$ (* signifies abroad), with a share α^* of foreign investors (from country 2) in the capital stock of the domestic economy (country 1), a share α in the foreign capital stock can be ascribed to domestic investors (with a real exchange rate $q^* := eP^*/P$, where e is the nominal exchange rate and P the price level):

$$(11) \quad Z = Y(1 - \alpha^*\beta) + \alpha\beta^*Y^*q^*$$

$$(12) Z^* = Y^*(1-\alpha\beta^*) + \alpha^*\beta Y/q^*$$

In this context, for savings in a model situation with cumulated foreign direct investment and cumulated domestic direct investment abroad:

$$(13) S = (1-\tau) Y(1-\alpha^*\beta) + \alpha\beta^*Y^*q^*$$

Thus, considering an open economy – with technologically leading and very innovative firms -, one can modify the production function (WELFENS, 2017a, appendix 4):

$$(14) Y = (1+v_h)(1+v'_x)(1+v''_j)K^\beta(AL)^{1-\beta}$$

Note, v , v' und v'' are positive parameters, h is the share of high-technology products (here, one can pick up the argumentation of JUNGMITTAG (2004)), x is the export intensity – incorporating the argumentation of MELITZ (2003) -, j is the import intensity; regarding the latter, if applicable, one can focus on imported intermediate products. JUNGMITTAG shows empirically for selected EU countries, that it is not only specialization per se which contributes positively to growth, but high-technology specialization. MELITZ (2003) argues that exporting firms – in an economy with heterogeneous firms – have a higher productivity than firms which do not export. Here, the level of capital intensity K/L , the per capita income growth path $y:=Y/L$ and the level of the steady-state path for $K/(AL)$ are positively influenced by h , x and j . If one assumes that v_h , v'_x and v''_j are each close to zero, then taking the logarithm, one can write:

$$(15) \ln Y = v_h + v'_x + v''_j + \beta \ln K + (1-\beta)(\ln A + \ln L)$$

In such a specification, the growth rate (g) of Y (where a is the growth rate of knowledge; n is the growth rate of the population) is:

$$(16) g_Y = v_h \frac{dh}{dt} + v'_x \frac{dx}{dt} + v''_j \frac{dj}{dt} + \beta g_K + (1-\beta)(a+n)$$

The growth rate of Y will also be raised by a rise of the high-technology, export and import intensities, moreover the growth rate of the capital stock, the growth rate of knowledge and the growth rate of the population, have a positive effect on real economic growth. Thus, the growth rate of Y can be written in a compact form. By the growth rate of the capital stock, the growth rate of knowledge and the growth rate of the population as well as a rise in export and import rates and the high-technology intensity. Insofar as the export intensity temporarily declines, economic growth can nevertheless remain stable or even increase – with constant j , a , n and constant K growth rate- , namely if the high-technology intensity rises sufficiently strongly. In this context, the innovation policies of the state and naturally also the research policies of firms are of fundamental importance.

3. Conclusions and Economic Policy Conclusions

BREXIT is likely to bring a strong real depreciation of the Pound. This will facilitate foreign investors in taking over British banks and firms. By implication, the UK will face lower net income (read here: net dividend payments received) from abroad; moreover, this implies that the level of the long-term per capita consumption path will be reduced. The British government might try to counteract this effect by placing more emphasis on the promotion of research and development; and indeed in particular on high-technology promotion. Whether or not the government will be able to realize such a new policy choice in the future remains to be seen; the immediate reactions of the May government do not include any such measure.

One clearly has to expect that BREXIT will bring about a higher share of foreign capital stock ownership in the UK and thus a reduction of the long-term per capita consumption compared to the baseline (without BREXIT). Thus far this effect has been neglected in the BREXIT debate and the Treasury study of the Cameron government ignored this effect altogether. By implication, the negative welfare effects of BREXIT will be larger in the long run than the UK Treasury study suggests; this analysis has not considered the effect of BREXIT on the foreign ownership of the British capital stock.

To the extent that foreign investors with international merger & acquisition projects come to a modest extent from OECD countries and to a considerable extent from China and other Asian Newly Industrialized Countries, the UK can expect rather limited international technology transfer effects in the context of rising international M&As in the UK. One may anticipate that Chinese foreign investors will be eager to increasingly acquire British banks and manufacturing firms in the context of BREXIT. The available evidence of Chinese FDI in the UK shows mixed success stories from a financial perspective (ZHU/MOELLER, 2016).

It remains to be seen how strong the real Pound depreciation in the next decade will be and it is also unclear how the net asset position – based on flow effects in the context of the current account – will evolve. A structural real depreciation will mean that British workers will have to export more per unit of goods imported on the one hand, on the other hand there will be a worsening of the terms of capital and higher dividend payments will accrue to parent firms abroad and foreign investors, respectively.

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