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STRUCTURAL FRAGILITY OF THE TOURISM-LED  
RECOVERY IN ICELAND**

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# ***The Danger of a “Geyser Disease” Effect: Structural Fragility of the Tourism-Led Recovery in Iceland***

**Francesco Macheda<sup>☒</sup> and Roberto Nadalini<sup>☒</sup>**

## **Abstract**

The fall of the Icelandic economy in 2008 highlighted the destructive effects of unbridled markets. Yet, the small Nordic country has experienced an impressive recovery, so much so that in recent years its annual growth rates have been significantly higher than those of the overwhelming majority of advanced capitalist countries. Several commentators have attributed this extraordinary accomplishment to the interventionist state policies adopted by successive Icelandic governments. The aim of this article is to debunk this myth by delving into the fragile foundations that the current Icelandic economic boom rests on. We argue that the substantial growth of the real exchange rate has made the rapid absorption of unemployment compatible with price stability during the recovery period. At the same time, the boom in tourism services made the impressive appreciation of the Icelandic króna compatible with the country’s external balance. However, the laissez-faire approach shown by the Icelandic authorities towards the krona appreciation has severely penalized most of the tradable sector, in which the bulk of skilled labor is usually concentrated. Arguably, the heavy specialization in the tourism sector, by restricting sources of productivity growth and international competitiveness, will render the current level of unemployment and real wages inconsistent with internal and external equilibrium in Iceland in the long run.

*Key words:* Natural rate, Wage, Real exchange rate, Human Capital, Marxian

*JEL classifications:* E24, F31, J24, O33, B51

## **1. Introduction**

The economic growth achieved by Iceland in the wake of the banking collapse that shook the Nordic country in 2008 has been extraordinary. After suffering one of the largest falls in GDP on an international scale over the 2009-2010 period, the small Atlantic island enjoyed a robust recovery. The aggregate growth in output was higher than 25 percent between 2011 and 2018 – more than twice that seen in other OECD countries. ‘The miraculous story of Iceland’ (O’Brien 2015) has generated a mix of enthusiasm and admiration among policymakers and academics. Many of them have attributed the merits of this miracle to the active intervention of the central bank and the successive governments since the beginning of 2009, which allegedly implemented a series of unorthodox monetary and fiscal measures

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diametrically opposed to the standard prescriptions suggested by mainstream economic theory (Hart-Landsberg 2013; Matthíasson 2015; Sigurgeirsdóttir and Wade 2015; Olafsson 2016; Bohoslavsky 2017, pp. 106-7; Farnsworth and Irving 2017). Overall, it is alleged that as a result of this conduct, Iceland has emerge ‘from the “perfect storm” in surprisingly good shape’ (Baldursson et al. 2017, p. 26), even becoming a ‘healthier and more equal society’ (Blyth 2013, p. 240). Indeed, a plurality of indicators seem to confirm the success of the Icelandic growth path: between 2010 and 2017, the unemployment rate plunged from 7,6 to 2.8 percent. At the same time, the employment rate rose from 74 to 80 percent, that is, the highest employment rate of any OECD country.

The fact that the extraordinary tight labor market had no significant effect on the growth rates of the economy would seem to disprove, at least in our case study, the Marxian theory of the reserve army of labor which will be defended in this paper. According to Marx (1847/1952; 1867/1990), the shrinking of the industrial reserve army in periods of rapid economic growth reduces the competition among sellers of labor and increases their bargaining strength, thereby shifting the distribution of income in workers’ favor. *Ceteris paribus*, the volume of profits is correspondingly squeezed, thereby weakening the firm’s capacity to invest, insofar as investment depends on the profit margin. It follows that the accumulation of capital requires an excess of labor which, by maintaining a downward pressure on wages, sets the economy on a path of sustainable growth.

Does the continuous fall in the unemployment rate with no discernable slowdown in economic growth disprove Marx’s theoretical prediction? Our answer is negative. We show that foreign trade has the capacity to hasten the process of accumulation, at least in the short run. To the extent to which it allows domestic firms to partly lower the cost of producing goods and services as a result of cheaper imported capital and wage goods, foreign trade “tends to raise the rate of profit” (Marx 1894/1967, p. 237), thereby permitting an accommodation of wage demands resulting from high levels of employment. As for the Icelandic case, we argue that the positive effects of foreign trade have been magnified by the strong currency appreciation, inasmuch as it contributed to limiting the erosion of profitability during the recovery period.

The massive influx of tourists has played a decisive role in this respect. From 2010 to 2017, tourism contribution to GDP increased from 3.4 to 8.6 percent, becoming the second largest sector of the economy. However, the substantial growth of the real exchange rate resulting primarily from the significant increase in revenues from tourism has inhibited the reorientation of the country’s productive structure towards sectors with a higher technological sophistication. More specifically, we provide evidence that the expansion of the leisure-tourism industry acted as a driver of “Beach disease” (Holzner 2011) for the Icelandic economy, which one can contextualize as “Geyser disease”. While inducing a significant increase in output in Iceland generally, the demand shock resulting from inbound tourism boom has led to a relative contraction of the traded sectors of the economy which are traditionally more receptive to skilled labor and technological innovation

(Gylfason 2001; Torvik 2001; Nowak et al. 2003; Capó et al. 2007; Ghalia and Fidrmuc 2018). Arguably, this shift of productive resources towards labor-intensive tourism services led to a reduction in the competitiveness of the Icelandic tradable-good sector that, in turn, will undermine the foundations of sustainable economic growth in the coming years.

The article is structured as follows. In section 2, we shed some light on the apparent contradiction between the strong growth in employment and the non-inflationary nature of the Icelandic recovery, by taking into account the role of the real appreciation of the Icelandic króna (ISK). In the subsequent section, we focus on the fundamental instability of a development path based on the tourism sector, especially with regard the maintenance of an external balance. In section 4 we look at the central role played by technologically advanced sectors in ensuring wage and employment growth that is sustainable in the long term. We argue that the fiscal and monetary policies undertaken during Iceland's "miraculous recovery" condemned the country to rely on low value-added activities. Section 5 draws the conclusions which we use to outline some policy implications that could be useful in promoting sound growth policies not only for Iceland, but also for other economies.

## **2. Real Currency Appreciation and the Accommodation of Inflationary Pressures**

Using the theoretical perspective of Marx as a point of departure, we suggest that there is some rate of unemployment below which the "excessive" bargaining power of workers will lead to an increase in wages that ends with the halting of the accumulation process. This means that in a market economy, there exists a given rate of unemployment which makes the working class more conciliatory by accepting a real wage consistent with a profit rate below which the capitalists refuse to invest.<sup>1</sup> Rowthorn (1980) calls this the "normal" rate of profit and argues that when unemployment is below its natural level, low competition on the labor market drives workers to tighten up their demands, thereby spurring a distributional conflict between labor and capital. Such conflict is likely to have an inflationary impact on the economy, forasmuch as the gains that the working class believes to have initially obtained in the wage bargaining process are thwarted by an unexpected rise in prices, followed by a rise in inflationary expectations and an even higher wage increase in the subsequent wage bargaining round.

The wage-price spiral described by Rowthorn resembles that illustrated by the proponents of the NAIRU concept<sup>2</sup> (Stockhammer 2008) and is brought to a halt only once the unemployment rate returns to its equilibrium level, which brings the wage aspirations of workers in line with a feasible real wage that is consistent with the aforementioned "normal rate of profit".

Once we have established the wide consensus which exists across the ideological spectrum concerning the existence of a long-term convergence towards the NAIRU, it remains to be clarified why the very low rates of unemployment have not led to runaway

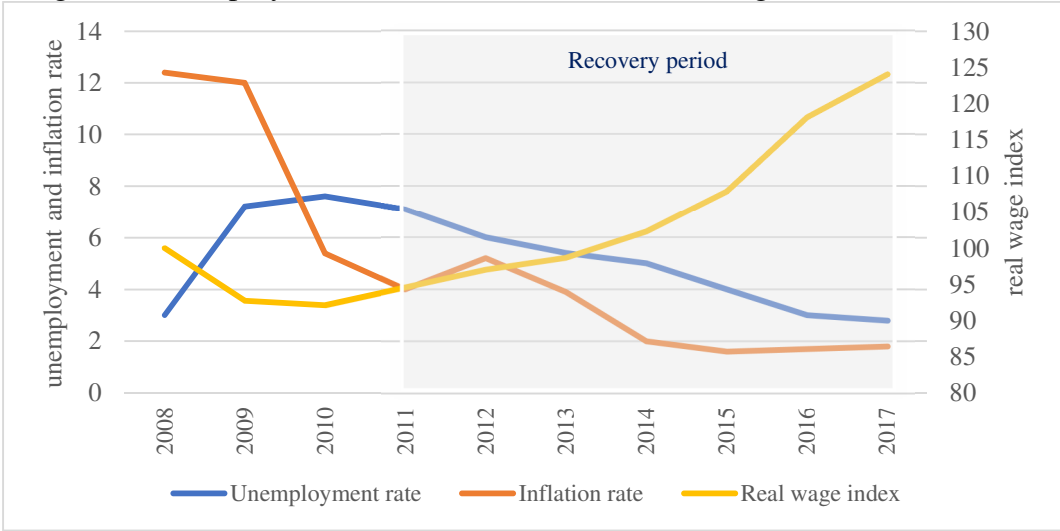
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<sup>1</sup> As Caporaso and Levine (1992, p. 17) succinctly put it: 'when capitalists 'accumulate little capital, productivity stagnates. Wages do not improve'.

<sup>2</sup> The non-accelerating inflation rate of unemployment (NAIRU) is defined as the lowest rate of unemployment that can be sustained over a long period of time without causing rapidly rising inflation.

inflation in Iceland. As a matter of fact, and contrary to the forecasts of the proponents of the NAIRU concept (Einarsson and Sigurdsson 2013, p. 3), the inflation rate remained below the target set by Central Bank (CBI), despite the rapid and constant reduction in the unemployment rate. Firstly, it should be noted that this phenomenon cannot be explained with a lack of elasticity of real wages to changing labor market conditions. As shown in Figure 1, the significant drop in the unemployment rate starting from 2010 was followed by a substantial wage boost. Nevertheless, the sustained wage dynamics did not give rise to inflationary flare-ups.

Figure 1. Unemployment rate, Inflation rate and Real wage index (2008 = 100)

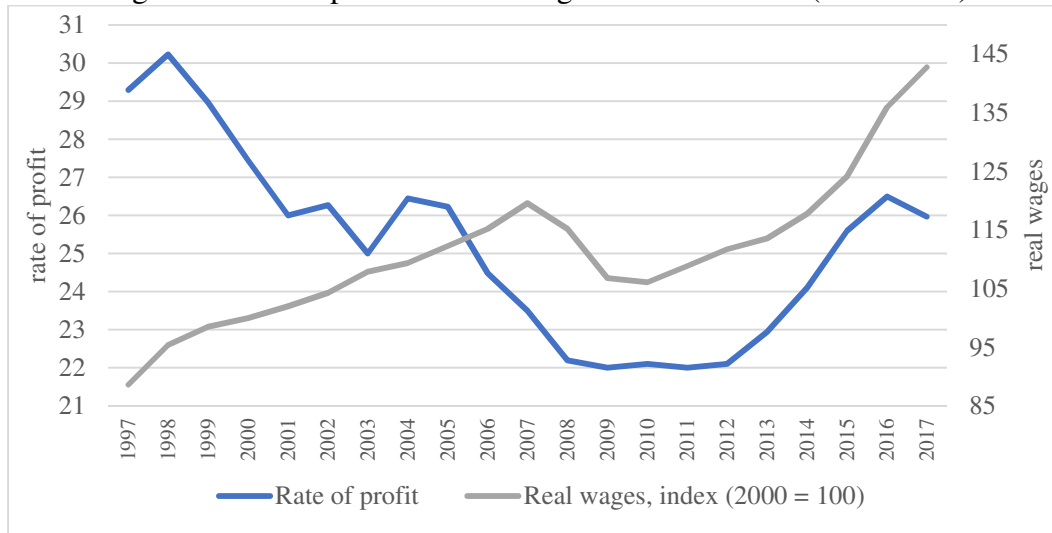


Source: Authors' elaboration from Statistics Iceland (2018a).

Should we therefore consider the possibility that wage growth in Iceland did not lead to a fall in the rate of profit such as to trigger an accelerated rise in prices? This hypothesis is supported by the data in the figure below, which shows that the rate of profit<sup>3</sup> never falls far below its historical average, and from 2012 at least until mid-2017 shows an upward trend in spite of unhampered wage growth.

<sup>3</sup> The rate of profit is calculated as follows: [(GDP – compensation of employees)/total capital stock] \*100.

Figure 2. Rate of profit and real wage index in Iceland (1997-2017)



Source: Authors' elaboration from Statistics Iceland (2018a).

A persuasive explanation of the low impact of real wage growth on profits lies in the Icelandic króna's dramatic appreciation from 2012 onwards. In this regard, we offer below a brief theoretical digression on the relationship between the real exchange rate, the profit rate and real wages. A real appreciation of a currency against foreign currencies corresponds to a fall in the relative price of foreign products in terms of domestic products, or a rise in the purchasing power of the national currency on international markets relative to its purchasing power within the country. The real exchange rate measures the relation between domestic prices and foreign prices expressed in a common currency. As a rule, the real exchange rate is estimated by comparing the consumer price indices (CPI) of the reference country with those of its trading partners. In order to measure a country's purchasing power of international goods, however, we believe it is more appropriate to estimate the real exchange rate as the relationship between the price level of domestic output and that of imports, measured into a common currency. We will call this index *output-import based real effective exchange rate (OIBREER)*.

$$\text{OIBREER} = \frac{\text{PGDP}}{\text{PM}} \quad (1)$$

Where: PGDP = GDP price deflator and PM = Import price deflator.

From this point of view, a real exchange rate revaluation can be interpreted as a nominal appreciation not followed by a decrease in the national output price level.<sup>4</sup>

In this condition, the price of domestically produced goods and services remains unaltered, while the one of imported goods and services decreases: as much as these imported goods and services are elements of capital goods and wage goods, the internal

<sup>4</sup> Equivalently, the real appreciation could be represented as an increase in output prices not followed by a nominal devaluation. However, in terms of our model the results are equivalent.

cost incurred for inputs decreases, while the output's price remains unchanged. This explains why the rapid growth of real wages does not necessarily translate into a fall in the rate of profit. The latter, in fact, depends on two key variables: the share of profits of the value added (profit share) and the output-capital ratio (the so-called productivity of capital). On the one hand, since the output volume of a given economy is composed of the sum of wages and profits, it follows that an increase in the share of this output appropriated by the labor force (an increase in the wage share) decreases the volume of profits appropriated by businesses. On the other hand, since the profit rate is calculated as the ratio between the volume of profits and the capital stock, an increase in the cost of the latter in relation to output (i.e. a decrease in the output-capital ratio) decreases the profitability of investment. If we start from the fundamental equation of the profit rate:

$$r = \frac{Y-W}{K} \quad (2)$$

Where:  $r$  = rate of profit;  $K$  = capital stock;  $W$  = mass of wages;  $Y$  = total output;  $Y-W$  = mass of profits.

If we divide the numerator and the denominator of this equation by  $Y$ , we will have:

$$r = \frac{Y-W}{Y} \div \frac{K}{Y} = \frac{Y-W}{Y} \times \frac{Y}{K} \quad (2.1)$$

The last equation shows us that, since profits consist in the share of output that doesn't go to labor in the form of wages, the profit rate can be written as the product of the profit share and the output-capital ratio. In what follows, we will show the impact of the real exchange rate on the two components of the profit rate. As for real wages, other things being equal,<sup>5</sup> a depreciation of wage goods means that the wage share decreases and therefore the rate of profit increases. This can be shown as follows. At every level of employment,  $\bar{e}m$ :

$$\Pi_{sh} = \frac{Y-W}{Y} \rightarrow \Pi_{sh} = g(\overset{+}{Y}; \bar{W}) \quad (3)$$

$$Y = Y^r \times P^y \rightarrow Y^r = f(\bar{e}m) \rightarrow Y = h(\overset{+}{P}^y) \quad (4)$$

Since  $\bar{e}m$  is exogenous to the model (i.e. is assumed to be constant), the variable  $Y^r$  is also constant:  $\bar{Y}^r$

$$W = W^r \times P^w \rightarrow W^r = l(\bar{e}m) \rightarrow W = m(\overset{+}{P}^w) \quad (5)$$

Since  $\bar{e}m$  is constant, the variable  $\bar{W}^r$  is assumed to be constant as well.

$$\Pi_{sh} = \frac{h(\overset{+}{P}^y) - m(\overset{+}{P}^w)}{h(\overset{+}{P}^y)} = \frac{h(\overset{+}{P}^y)}{h(\overset{+}{P}^y)} - \frac{m(\overset{+}{P}^w)}{h(\overset{+}{P}^y)} = 1 - \frac{m(\overset{+}{P}^w)}{h(\overset{+}{P}^y)} \rightarrow \Pi_{sh} = g(\overset{-}{P}^w; \overset{+}{P}^y) \quad (6)$$

<sup>5</sup> That is, assuming an unchanged constant price of output, consistent with our definition of real appreciation, and unchanged wages.

According to our definition, a change in the real exchange rate determined a change in import prices but not in output prices. Since part of the wage goods are imported:

$$P^w = x(\bar{E}^R) \rightarrow \Pi_{sh=y}^{\dagger}(\bar{E}^R) \quad (7)$$

Where:  $\Pi_{sh}$  = profit share;  $K$  = nominal capital stock;  $W$  = nominal value of total wage bill;  $Y$  = nominal GDP;  $P^y$  = PGDP;  $Y^r$  = real GDP;  $em$  = employment;  $W^r$  = mass of real wages;  $P^w$  = Private consumption deflator (PC);  $E^R$  = real exchange rate (OIBREER)

As for the cost of capital, other things being equal,<sup>6</sup> a depreciation of capital goods causes the output-capital ratio and therefore the rate of profit to increase. This too we can demonstrate mathematically. At every level of employment,  $\bar{em}$ :

$$Y = Y^r \times P^y \rightarrow Y^r = i(\bar{em})^+ \rightarrow Y = h(P^y)^+ \quad (8)$$

As noted above, since  $\bar{em}$  is exogenous is assumed to be constant, the variable  $Y^r$  is also constant:  $\bar{Y}^r$

$$K = K^r \times P^k \rightarrow K^r = b(\bar{Y}^r; \bar{C}_t)^+ \rightarrow K = c(P^k)^+ \quad (9)$$

Since  $\bar{Y}^r$  and  $\bar{C}_t$  are exogenous to the model, the real capital stock is also constant:  $\bar{K}^r$

$$\frac{Y}{K} = \frac{h(P^y)^+}{c(P^k)^+} \quad (10)$$

According to our definition, a change in the real exchange rate determined a change in import prices but not in output prices. Since part of the capital goods are imported:

$$P^k = d(\bar{E}^R) \rightarrow \frac{Y}{K} = e(\bar{E}^R)^{\dagger} \quad (11)$$

Where:  $K$  = nominal capital stock;  $K^r$  = real capital stock;  $P^k$  = Investment goods price deflator (PI);  $C_t$  = real capital stock per worker.

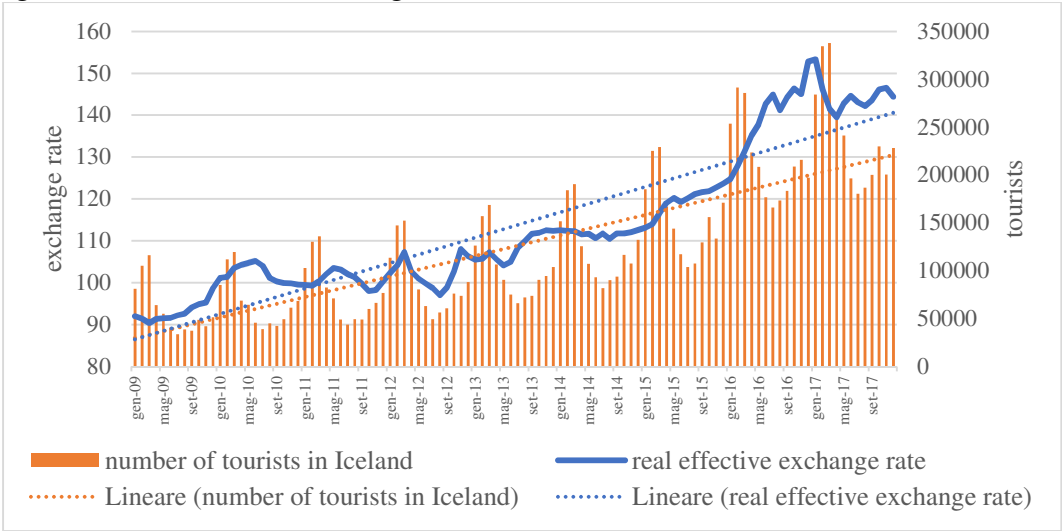
The preceding equations show why strong wage increases do not necessarily translate into a collapse of the profit rate: a real appreciation, by depreciating the cost of imported wage and capital goods, may act as a countertrend to the fall in profitability. In turn, the maintenance of the rate of profit in the face of real wage increases makes it unnecessary to increase prices in the face of increased employment and income from labor, which thus avoids triggering an inflationary spiral that could only be resolved with a decline in employment and wages. In fact, a real appreciation increases the level of employment and wages that is compatible with price stability, i.e. it has both a deflationary and expansive impact.

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<sup>6</sup> That is, assuming an unchanged constant price of output, consistent with our definition of real appreciation, and unchanged real capital per employee.

This is exactly what happened in Iceland. During the post-crisis period, the growth of demand for tourism services was accompanied by a corresponding inflow of foreign currency. From 2009 to 2017, the number of foreign visitors to Iceland increased more than four fold, from 715,000 to 2.88 million. The massive inflow of tourists was naturally followed by massive expenditure on consumption products and services. The latter increased six fold over the same period, reaching the astronomical figure of almost US\$12 billion between 2010 and 2017. The large foreign currency inflows due to growth in tourism triggered the real appreciation of the national currency, the Icelandic króna (Figure 3).

Figure 3. Real effective exchange rate and number of tourists in Iceland (2009-2017)



Source: Authors’ elaboration from CBI (2018a) and Statistics Iceland (2018a).

The movement of the real exchange rate had a strong impact on the two components of the rate of profit. On one hand, the appreciation increased the profit share in the face of an unchanged real wage. On the other, the appreciation increased the output-capital ratio in the face of an unchanged capital per worker. With regard to the profit share, we started from

the concept of “hypothetical wage mass”.<sup>7</sup> We refer to this as the total amount of nominal wages necessary to maintain the actual overall payroll unchanged (in real terms), assuming that the growth of personal consumption prices coincides with that of output. The hypothetical wage mass can be calculated as follows:

The hypothetical wage mass is

$$W_t^H = P_t \times \widehat{W}_t \quad (12)$$

Where  $P$  is the GDP price deflator and  $\widehat{W}$  is the real wage. We can rewrite

$$W_t^H = \frac{P_t}{P_t^C} \times W_t \quad (12.1)$$

Where  $W_t$  are nominal wages and  $P^C$  the price level of consumer goods. By definition we have the following

$$W_t^H = (1 + \dot{W}_t^H) W_{t-1}^H \quad (12.2)$$

Where  $\dot{W}_t^H$  is the growth rate of  $W^H$  at  $t$ . So, if  $\dot{W}_0^H = W_0$ , all we need to know to compute  $W_t^H$  for  $t = 1, 2, \dots$  is  $\dot{W}_t^H$ .

Looking at eq. (12.1) we know the following

$$\dot{W}_t^H \simeq \dot{P}_t + \dot{W}_t - \dot{P}_t^C \quad (12.3)$$

Thus we conclude

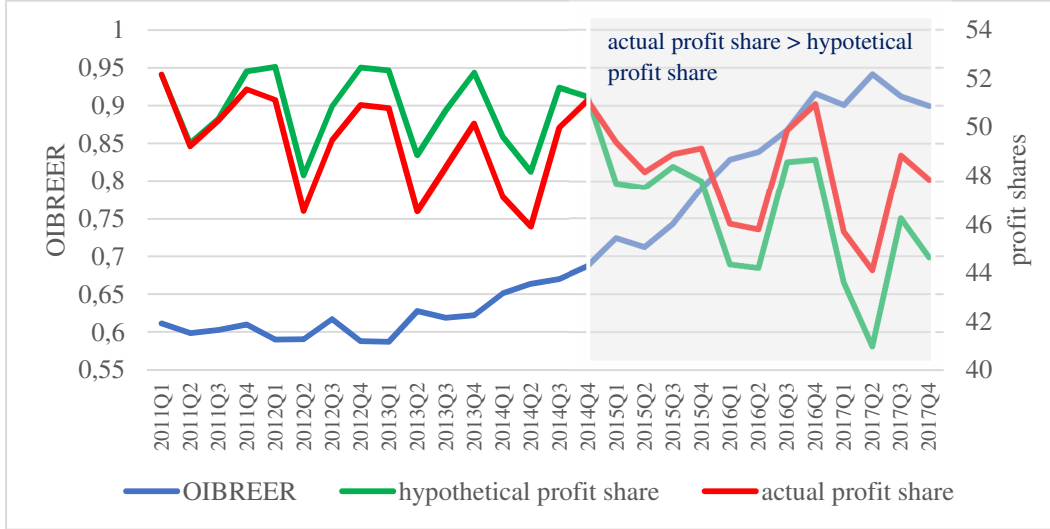
$$W_t^H = (1 + \dot{P}_t + \dot{W}_t - \dot{P}_t^C) W_{t-1}^H \quad (12.4)$$

At this point, dividing the hypothetical wage mass by the correspondent GDP, we can calculate the hypothetical wage share. From this, we can finally deduce the hypothetical profit shares. These are understood as profit share of GDP based on the hypothesis that nominal wages coincide with hypothetical ones. The Figure 4 below shows that the effective profit share is overall higher than the hypothetical profit share during the period of recovery. If we focus only on the steepest period of currency appreciation (2014-2017), the movement in the real exchange rate raised the profit share by an annual average of 3,6 percent, from 44,4 to 48 percent.

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<sup>7</sup> All variables for the calculations in this section are collected from the Quarterly Macroeconomic Model (QMM) of the Icelandic Economy (see Daníelsson et al. 2015) and the underlying quarterly database (see CBI 2018a) which have been under construction since 2001 at the Research and Forecasting Division of the Economics Department at the Central Bank of Iceland.

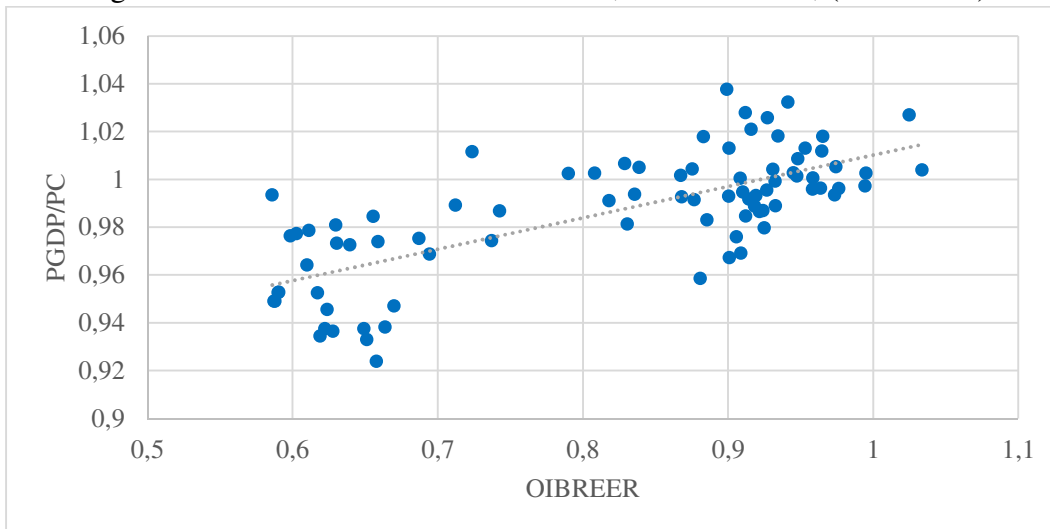
Figure 4. Dynamics of real exchange rate, hypothetical and actual profit share



Source: Authors' elaboration from CBI (2018a).

It is worth reiterating that this surplus of profits does not derive in any way from a reduction in real wages, but rather from an overall higher growth of output prices compared to that of personal consumption prices. As the Figure 5 shows, the relative growth of the PGDP depends on the movement of the real exchange rate, which, by definition, depresses the prices of a share of private consumption (the imported wage-goods) compared to output prices. It is therefore not surprising to find a positive relationship between the trend of the real exchange rate and the relationship between the effective profit share and what would result from a uniform price trend ( $PGDP = PC$ ).

Figure 5. Correlation between OIBREER, PGDP and PC, (1997-2017)



Source: Authors' elaboration from CBI (2018a).

As far as the second component of the rate of profit is concerned, we estimated the impact of the real exchange rate on the output-capital ratio. To do so, we calculated the

hypothetical nominal capital stock, which is defined as that capital stock that would have occurred if the prices of capital had followed the same trend in output prices.

The hypothetical capital stock is 
$$K^h = P \times K^r \quad (13)$$

Where  $P$  is the GDP price deflator and  $K^r$  is the real capital stock. We can rewrite 
$$K^h = P \times K^r \quad (13.1)$$

Where  $K^h$  is the nominal capital stock and  $P$  the price level of investment goods. By definition we have the following 
$$K^h = (1 + g) \times K^h_{t-1} \quad (13.2)$$

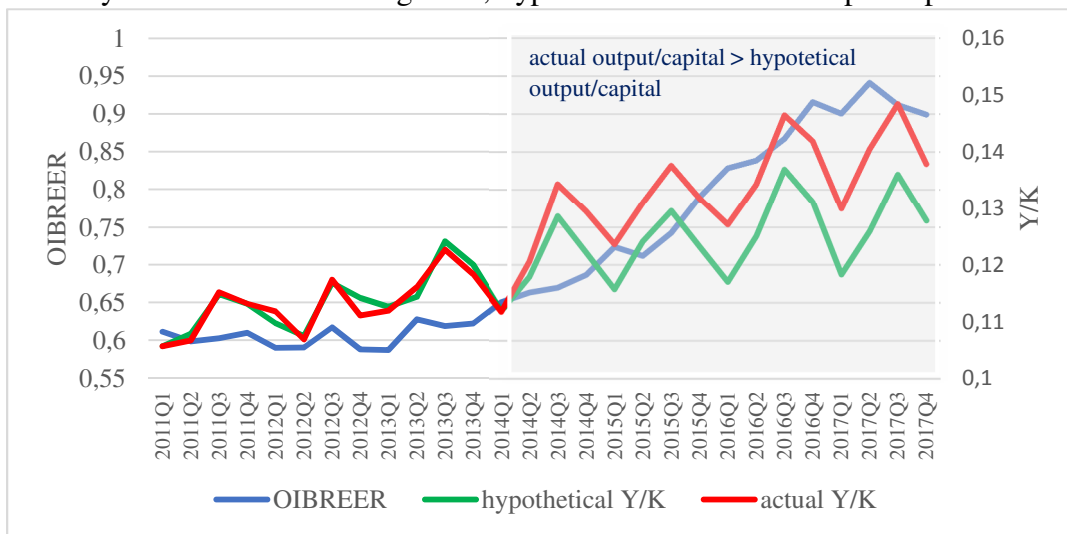
Where  $g$  is the growth rate of  $K^h$  at  $t$ . So, if  $g = \frac{\Delta K^h}{K^h}$ , all we need to know to compute for  $t = 1, 2, \dots$  is  $K^h_0$ .

Looking at eq. (13.1) we know the following 
$$K^h = P \times K^r \quad (13.3)$$

Thus we conclude 
$$K^h = (1 + g + \frac{\Delta P}{P}) \times K^h_{t-1} \quad (13.4)$$

At this point, dividing the GDP of each period by the hypothetical capital stocks, we can calculate the hypothetical output-capital ratio. The Figure 6 below shows that the actual output-capital ratio was overall higher than the hypothetical output-capital ratio during the recovery period. If we focus only on the steepest period of currency appreciation (2014-2017), the movement of the real exchange rate raised the productivity of capital by an annual average of 6,9 percent.

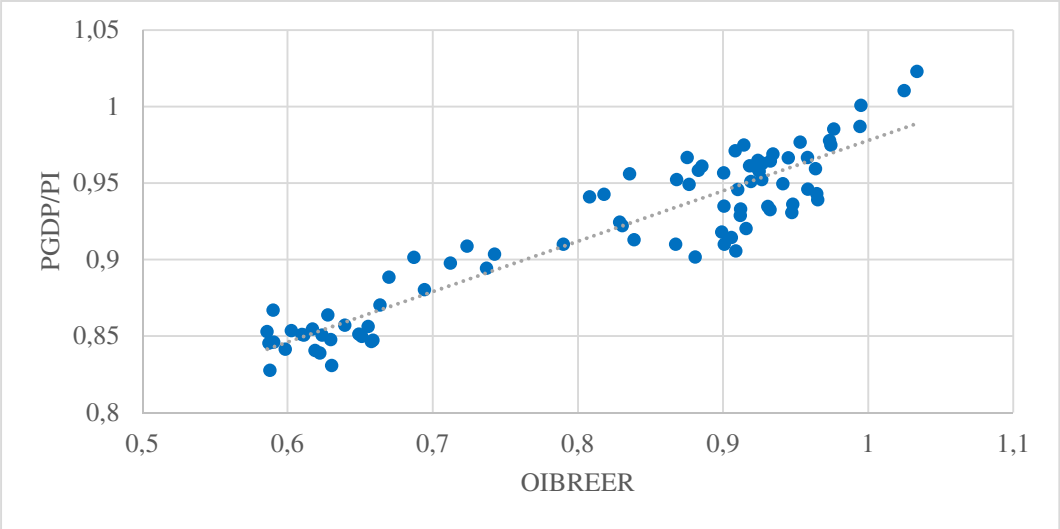
Figure 6. Dynamics of real exchange rate, hypothetical and actual output-capital ratio



Source: Authors' elaboration from CBI (2018a).

It is worth recalling that an increase in capital productivity expresses an overall higher growth in output prices compared to that of investment goods prices. As Figure 7 shows, the relative growth in PGDP depends on the movement of the real exchange rate, which, by definition, depresses the prices of a share of capital goods (the imported capital goods) compared to output prices. It is not surprising that we see a positive relationship between the movement of the real exchange rate and the relationship between the actual output-capital ratio and what would result from a uniform price trend (PGDP = PI).

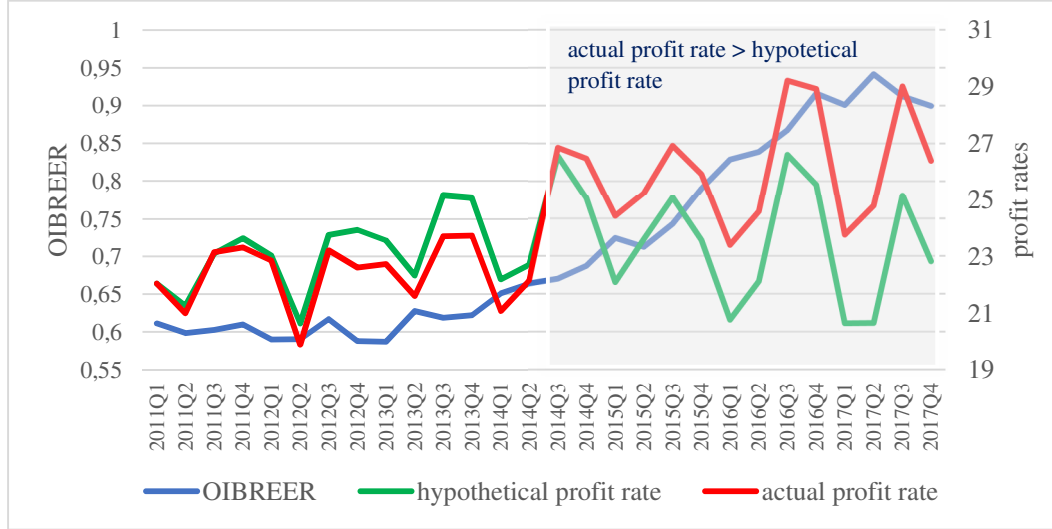
Figure 7. Correlation between OIBREER, PGDP and PI (1997-2017)



Source: Authors' elaboration from CBI (2018a).

At this point, we can quantify the overall impact of the real exchange rate on profitability, by using the equation (2.1). To this end, we compared the profit rate calculated by reference to the actual profit share and the actual Y/K ratio, with the profit rate calculated on the basis of the hypothetical profit share and the hypothetical Y/K. We defined the latter as hypothetical profit rate corresponding to a situation in which the prices of personal consumption goods (wage-goods) and investment goods (capital goods) move parallel to the prices of the output ( $\Delta PC = \Delta PI = \Delta PGDP$ ). We verified that there is a strong positive correlation between the movement of the OIBREER and that of the rate of profit in relation to the hypothetical profit rate. This indicates that a real appreciation (depreciation) increases (decreases) the rate of profit assuming an unchanged real wage. This occurs by virtue of the relative reduction (increase) in the price of imported goods, which manifests itself in the divergence between the indices of output price on one hand, and those of capital goods and wage-goods on the other. During the recovery period, the mechanism described above played out quite clearly (Figure 8): the acceleration of the real appreciation of the króna between 2013 and 2014 led an average increase of 16,8 percent in profitability, compared to the hypothetical situation in which there was no real depreciation of wage and capital goods.

Figure 8. Dynamics of real exchange rate, actual and hypothetical profit rates (2011-2017)



Source: Authors' elaboration from CBI (2018a).

We have repeatedly stressed that the real exchange rate has a positive effect on the rate of profit assuming an unchanged real wage. Now all that remains is to show the positive effect of the real exchange rate on the real wage assuming an unchanged profitability. To do this, we needed to determine the real wage level that in the hypothetical situation ( $\Delta PC = \Delta PI = \Delta PGDP$ ) would make the rate of profit equal to the actual rate. According to our estimate (see Appendix), in the period of stronger appreciation of the ISK (2014-2017), the actual real wages are, assuming an unchanged rate of profit, on average 14,9 percent higher than they would have been in the situation where prices moved uniformly.

To sum up, the revaluation of the króna, by lowering import prices, significantly contributed to make high levels of employment and wages compatible with high profitability and low inflation throughout the recovery phase in the second decade of the twenty-first century.

### 3. The Structural Weakness Inherent to Tourism-Led Economic Growth

On the basis of what has been said so far, must we then conclude that a sustainable growth path ultimately consists in a continuous overvaluation of the real exchange rate? Obviously, things are more complicated: even assuming that the monetary authorities can determine at will the real exchange rate, such a maneuver would have detrimental effects on the external equilibrium. Firstly, because, other things being equal, an increase in the purchasing power of domestic residents is associated with an increase in imports. Secondly, because the prices of tradable goods are determined internationally. Given this condition, in the face of a nominal appreciation of the currency and a downward rigidity of profit margins and sales prices, companies operating in the tradable sector would lose competitiveness on international markets and would be displaced by foreign competition. For these reasons, a substantial real appreciation might lead to a current account deficit, which is an unsustainable situation in the long run.

In Iceland, however, the real exchange rate was able to markedly appreciate without causing any current account deficits thanks to the tourism boom (CBI 2016). In other

words, the upward shift in the demand curve due to increase in the perceived attractiveness of the territory made an adjustment of the real exchange rate superfluous. While it is true that ‘heavy króna depreciation in the wake of Iceland’s banking crisis might have helped promote the initial pick up in tourism’ (IMF 2017, pp. 5-6), it is equally true that the ‘subsequent appreciation has not deterred the sharply rising number of arrivals’ (Ibid.). Although the continuous appreciation of the króna has turned Iceland into the most expensive tourist destination in the world,<sup>8</sup> the number of foreign tourists visiting Iceland have risen from just under half a million to over two million between 2011 and 2017.

The expansion of the tourism sector is mirrored in the growing share of foreign exchange earnings from tourism as a percentage of total exports, which has increased from 26.4 percent to 42.0 percent between 2013-2017 (Icelandic Tourist Board 2018, p. 2). This has allowed Iceland to accumulate significant current surpluses, thanks to which the country has been able to regain credibility among international investors during the post-crisis period. Indeed, the downward spiral which led the balance on goods to accumulate deficits close to ISK 50 billion in 2017 has been more than compensated by the massive export revenues coming from the tourist sector.

The problem in maintaining an external balance in such a way is that the tourism boom may easily come to a halt, for a host of different reasons. Firstly, it would appear that the continuous appreciation has started to dissuade potential visitors, leading one of the largest Icelandic banks to announce that ‘the tourism boom is over’ (Landsbankinn 2018). Indeed, at least up to 2016, the exchange rate appreciation has had a limited effect on a range of tourism prices due to multi-year pricing agreements with foreign tour operators – agreements often stipulated in foreign currency. However, the substantial revaluation of the Icelandic currency has pushed the more heavily exposed businesses to start pricing in króna rather than foreign currency to keep prices stable. The preservation of profit margins guaranteed by this strategy has nevertheless made ‘Iceland less competitive with other destinations’ (Sutherland and Stacey 2017, p. 16). The data would seem to confirm this dynamic: prices for some tourism services have been rising at breakneck speed over the last two years. This has notably slowed down the rate of growth of the number of tourists visiting Iceland – from 41 to 10 percent between July 2017 and June 2018. Moreover, the strengthening króna has produced a wave of cancellations, the main culprit of which is high prices, which ‘has made visiting the country unfeasible for a large segment of travelers’ (Þórssón 2017; RUV 2018).

Secondly, it is not far-fetched to hypothesize that the downward trend that we have witnessed in the last year could stretch into the near future. For example, the demand from high-income tourists may fall at a more sustained rate if Iceland continues to attract mass tourism, consisting of middle- or low-income people. To paraphrase Hirsch (1976, p. 27), the ‘congestion or crowding through more extensive use’ of Icelandic tourist sites, with the environmental degradation that this implies<sup>9</sup>, might decrease the satisfaction derived by high-income tourists from having access to a unique destination offering adventure and

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<sup>8</sup> See Eurostat (2018), Harmonised Index of Consumer Prices (HICP), Hotels and restaurants 2017.

<sup>9</sup> For example, the over-construction of infrastructures and tourist facilities to cope with the increase in foreign visitors might exert heavy pressure on Icelandic non-renewable resources, thereby leading to their faster depreciation.

wild experiences. Not being able to signal their status to others through this sort of (positional) consumption, higher-income tourists might well shift their preferences towards new, exotic tourist sites ahead of the masses. Finally, Iceland could be negatively affected by an external shock outside of the country's control.<sup>10</sup>

Irrespective of the cause, if the downward trend concerning the growth of the tourism sector were to consolidate, the current level of revenue from tourism could only be sustained through a real depreciation of the Icelandic króna, which would make tourism services more competitive. If this does not happen, an external imbalance will arise, since the trade balance and the current account balance will be strongly affected by the decrease in exports (assuming unchanged imports). In this eventuality, the current real exchange rate could be maintained only at the price of a continuous flow of capital from abroad to cover the current account deficit. This would contribute to transform Iceland once again into an essentially parasitic economy, with the increasing external fragility that this implies.

In this regard, we must consider that the dynamics of capital flows are already laying the foundations for this transformation. Especially since the progressive lifting of capital controls, significant foreign net capital inflows have been registered. The latter can be explained by the yield spreads between Icelandic and other OECD countries' government bonds, which helped to attract foreign capital in search of high returns. Between the first quarter of 2015 and the first quarter of 2018, the financial account of the Icelandic balance of payments recorded a surplus of 467,000 million ISK. This capital inflow evidently played a non-marginal role in supporting the Icelandic exchange rate. However, it cannot be excluded that an increase in the risk aversion of investors, or the need to stop the formation of speculative bubbles, may cause a sharp reversal of the expansionary monetary policies that are currently dominant at the international level (BIS 2016).

#### **4. What Should Have Been Done Differently to Put the Icelandic Economy on a Sustainable Growth Path**

At this point, we have enough elements to argue that the current level of real wages is incompatible in the long run with internal stability, dependent upon price stability, and external stability, dependent upon a country's ability to not incur systematic current account deficits. But how could a country like Iceland reconcile a high purchasing power vis-à-vis international output with a balance of trade equilibrium, in such a way as to reconcile a high employment and wage level with an external balance in the long-run?

In our opinion, productive specialization plays a key role in this regard. Since the degree of international competition differs according to the commodity sector, specializing in sectors characterized by strong international competition involves facing a fierce race to the bottom on prices and therefore on wages. On the other hand, specializing in sectors characterized by a lower level of international competition implies a lower downward pressure on prices and wages. Under such conditions, and assuming a given rate of profit, employment and labor income can reach relatively high levels without eroding profits or market competitiveness.

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<sup>10</sup> As noted by Forbes (2018, p. 20), the eruption of Eyjafjallajökull in 2010 'is a stark reminder of the unpredictability and wide-ranging impact of geological events'.

To the extent that a permanent current account deficit is unbearable for any country other than the United States, then we have to conclude that, in the long-run, the wage level depends upon the degree of international competition – the latter being dependent on the level of productive specialization. The decisive element which helps to shelter an economy from fierce international competition is provided by the endowment of advanced knowledge and complex skills of its workforce (or in the neoclassical jargon, “human capital”), whose critical role is significantly related to the emergence of a new “technological paradigm” since the second half of the past century (Freeman and Perez 1988; Acemoglu 2002; Autor et al. 2003). Since then, the introduction of more complex production processes has created a mismatch between the demand and supply of skilled labor. This imbalance is visible globally in the return on tertiary education, which at the start of the millennium was rather significant (16.8 percent), compared to a return on secondary education of 6.9 cent and a return on primary education of 10.3 percent (Montenegro and Patinos 2013, pp. 8-9). The provision of scarce (hard to acquire) technological skills does not exclusively concern the highly qualified scientists mainly employed in research and development (R&D) divisions. In fact, the absorption of the new ideas developed by scientists, inventors, designers and technologists into the final product depends on the technical skills of the workers involved in the production sphere proper (Lall 2001; Wood 1994).

Given the persistent shortage of the skills required in the most advanced sectors of the global economy, it is not surprising that the uneven distribution of these skills leads to a growing divergence of per capita wages and income. Using education as a proxy for the endowment of the skills necessary for the adoption of advanced technologies, Barro (2013) concludes that the increase in human capital gained by a one-year increase in the average years of secondary and higher formal education leads to an overall increase in per capita GDP of 19 percent. In a similar vein, Hanusheke and Woessmann (2012) has shown that an improvement in the results of international tests for the evaluation of scientific knowledge such as the PISA cognitive tests determines on average a 2 percent increase of per capita income growth. We can therefore conclude that, based on the allocation of scarce and hardly reproducible factors of production such knowledge and productive abilities, countries tend to specialize in productive sectors with different technological levels (Ciccone and Papaioannou 2009). This hypothesis is supported by the concept of export sophistication which indicates the average income level of countries that export the same type of goods (Hausman et al., 2006). Based on the authors’ assumptions, the level of human capital largely explains a country’s productive specialization, which in turn explains its income level.

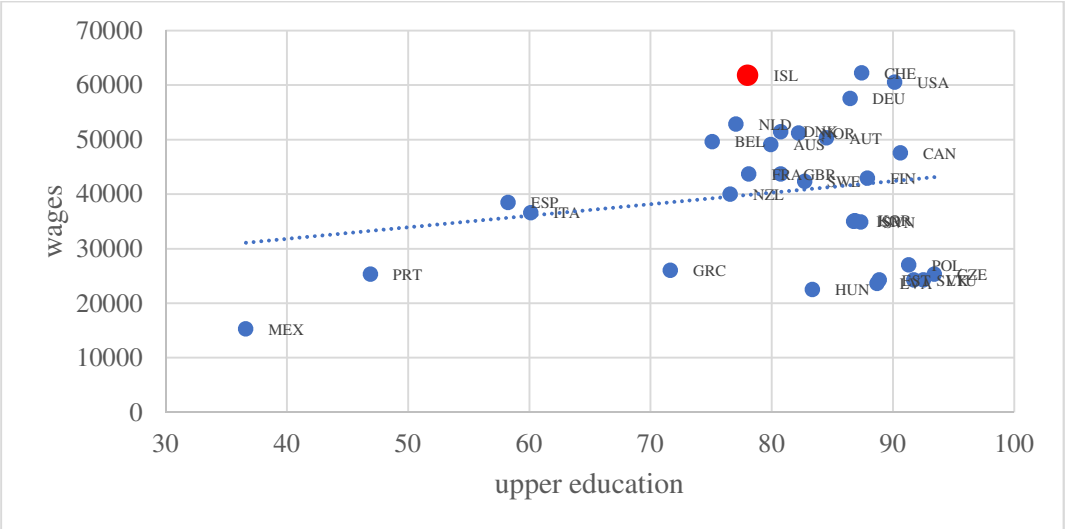
#### *4.1 The Mismatch Between Wage Level and Technological Capabilities in Iceland*

On the basis of these assumptions, can we state that the current level of Icelandic wages (and the unemployment rate consistent with it) is consistent with the technological degree of the productive system and with the national endowment of human capital? Before testing our hypotheses, it should be clarified that the aforementioned studies, in fact, relate the degree of labor skills and productive specialization with per capita *income* levels rather than the average wage level. However, the model we adopt implies that workers

appropriate at least a part of the higher incomes deriving from an international specialization in sectors with higher added value. This is based on the assumption that the profit rate is at its normal level and that an increase in productivity per hour worked leads to an immediate increase in profits. Other things being equal, companies will be incentivized to take on new labor until the wage increases resulting from increased employment don't return profits to the normal level, which in the meantime will rise along with capacity utilization. Technological improvement therefore translates into higher employment, higher incomes and higher hourly wages at an unchanged rate of profit.

We will begin by assessing whether the wage level measured in international currency is consistent with the level of human capital. From the following chart (Figure 9) two conclusions can be drawn: in line with Barro's thesis, wages measured in dollars are generally positively correlated with the spread of higher education. However, compared to other OECD countries, Iceland has a wage level which, when compared to the percentage of the adult population with an educational level equal at least to a secondary school diploma, is markedly higher.

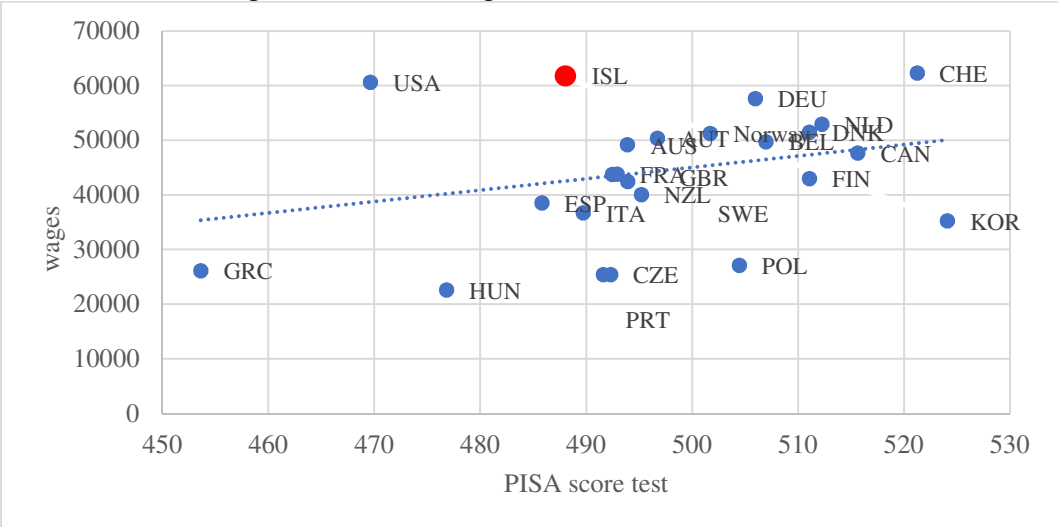
Figure 9. Labor wages in PPP / Upper education (secondary + tertiary education) in 2016



Source: OECD (2018b). Note: education data refers to 2016 (last available year); those on wages to 2017 (last available year). Wages are in 2017 constant prices at 2017 USD PPPs.

Let us now examine whether wages measured in international currency are consistent with the quality of the school system and the results in cognitive tests. Two conclusions can be drawn from the following chart: in line with the theses of Hanushek and Woessmann, wages are positively correlated with average results in PISA mathematical tests; in comparison with other OECD countries, Iceland has a wage level in dollars which, when compared to the average results obtained in the PISA tests by 15-year-old students from other high-income countries, appears to be significantly higher.

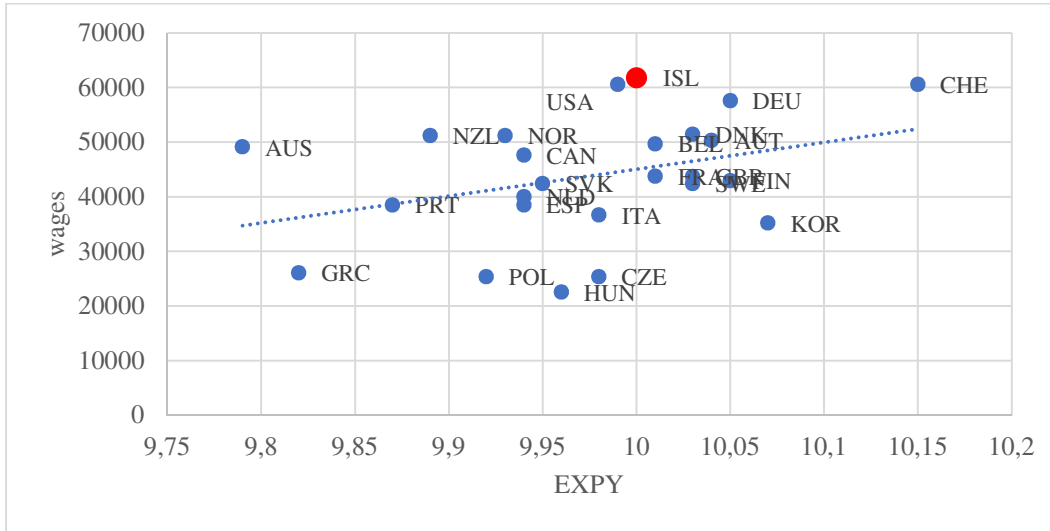
Figure 10. Labor wages in PPP / PISA score test



Source: OECD (2018b). Note: PISA score test refers to 2015 (last available year).

Let us now assess whether the country’s labor income measured in PPP is consistent with its level of export sophistication. The latter is estimated based on the productivity level of a country’s export basket (EXPY), which is measured simply as the GDP per capita of countries with a similar export package (Anan et al. 2012, p. 18). Accordingly, it is expected that high-income countries export the same types of goods, typically technologically advanced ones. Two conclusions can be drawn from the following figure: coherently with the thesis of Hausman et al., wages are generally positively correlated with the sophistication of exports. But compared to other OECD countries, Iceland has a salary level which, when compared to the sophistication of its exports, appears to be quite high. This data therefore also confirms that Iceland’s productive specialization does not justify the country’s current wage level.

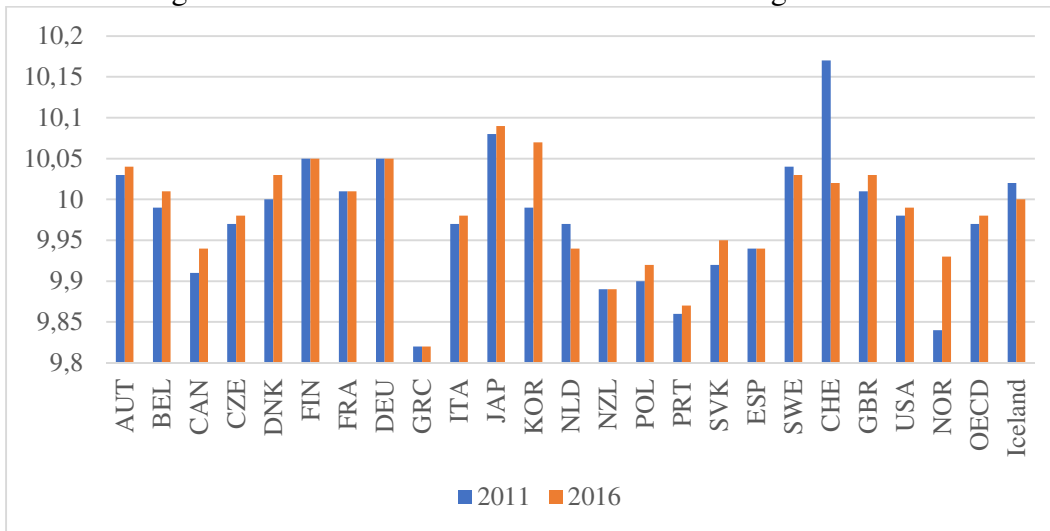
Figure 11. Relationship between Labor wages in PPP and EXPY



Source: World Bank (2018b), and OECD (2018b). Note. EXPY data refers to 2016.

In the following charts it is interesting to note first of all that during the economic recovery period, the Icelandic sophistication tends to decrease (Figure 12). We can therefore confidently rule out that the Icelandic recovery was driven by an increase in exports with a high technological content.

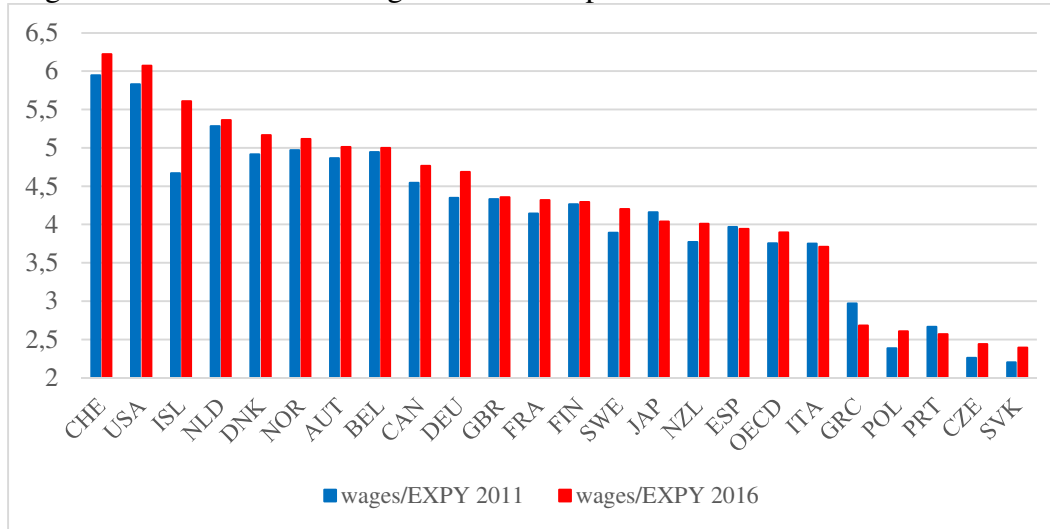
Figure 12. OECD countries with smallest and largest EXPYs



Source: World Bank (2018b).

Secondly, the ratio between the average salary and the expected salary based on the sophistication of exports is constantly increasing. Not only does it continue to be higher than the same ratio in OECD countries (Figure 13), but the gap continues to widen, if we consider that from 2011 to 2016 the wage/EXPY ratio grew by more than 20 percent, compared to an average increase in OECD countries of just over 3 percent. This means that the level of Icelandic wages is becoming increasingly unjustified on the basis of the country's productive specialization.

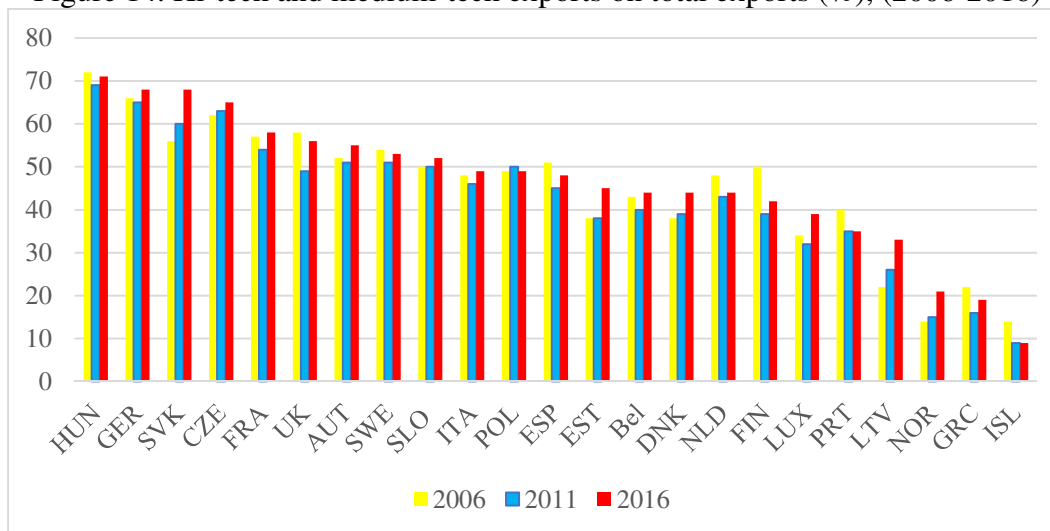
Figure 13. Ratio between wages in constant prices at 2017 USD PPPs and EXPY



Source: OECD (2018b) and World Bank (2018b).

We come to similar conclusions if we focus on the percentage breakdown of Iceland's exports according to two broad technological categories embodied in the final products, namely high-tech and medium-tech (Figure 14), which provides a good indication of the skills level associated with productive specialization and should therefore correlate with the wage level.

Figure 14. Hi-tech and medium-tech exports on total exports (%), (2006-2016)



Source: World Bank (2018b).

As the figure shows, the fall in the share of high- and medium-technology exports that occurred between 2006 and 2011 was not followed by a rebound, contrary to the great majority of European countries. Between 2011 and 2016, products with a high and medium technological content continued to constitute only 9 percent of total exports, compared to a European average of 48 percent, which is significantly higher compared to the previous

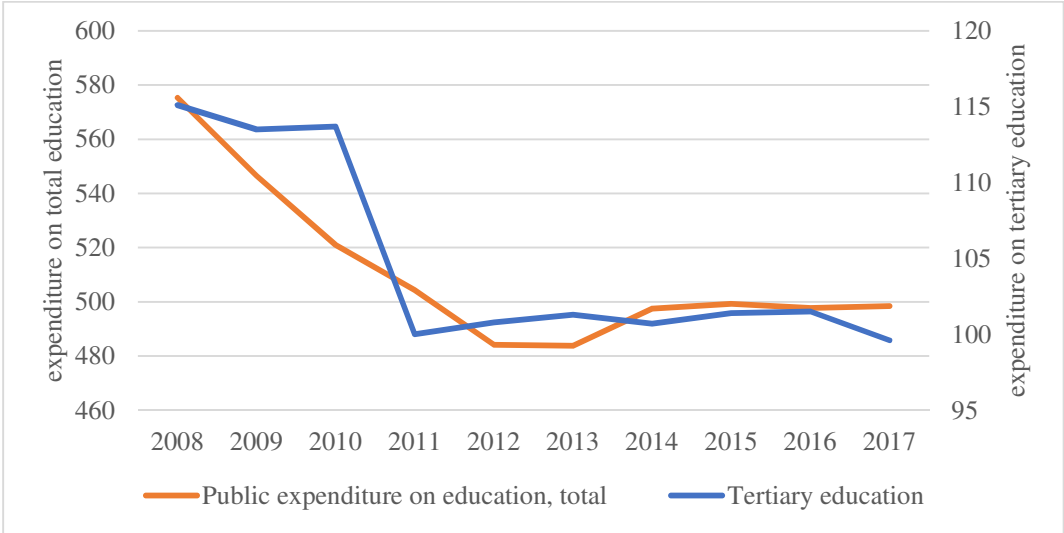
five-year period. Despite this, wages increased significantly faster in Iceland, if it is true that between 2011 and 2016 Icelandic real wages increased by 20 percent, compared to an average increase of 3.9 percent in OECD countries.

4.2 The Policy of Technological Stagnation

The data presented above confirms that the current labor income in Iceland as well as its dizzying growth during the country’s “miraculous recovery”, are not due to the development of more sophisticated technology and its introduction and dissemination into the national economy. On the other hand, if we assume that the introduction of more sophisticated technology depends on the scientific sophistication of labor resources, it logically follows that the qualitative improvement of the labor power of people is contingent on investment in training and education at all levels, and on a rapid increase in the number of scientists and human resources engaged in research and development work.

The Icelandic policy-makers’ neglect to boost the country’s technological capabilities is testified by the stagnation of investment in education and R&D in Iceland over the past decade.<sup>11</sup> The per capita expenditure on tertiary education fell by over 13 percent between 2008 and 2017 (Figure 15). The same goes for the per capita (public) expenditure on total education. Most likely, the latter are bound to further decrease in the coming years as a result of the Icelandic government’s 2016 decision to shorten the duration of the upper-secondary education from four to three years.

Figure 15. Public expenditure on total and tertiary education 2008-2017.



Source: Eurostat (2018). Note: Per capita in thousand ISK at 2017 prices.

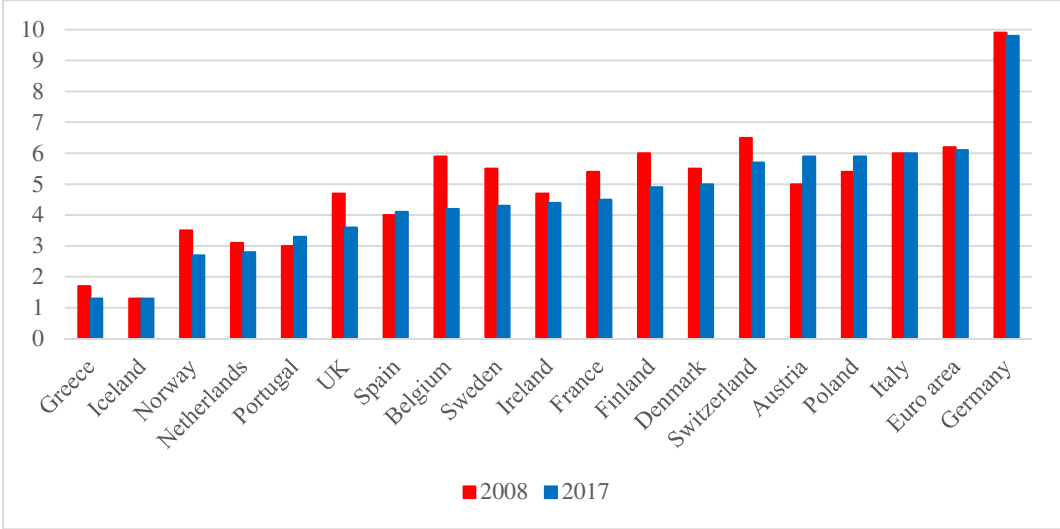
Data referring to R&D shows a similar similar trend. Although Iceland continues to devolve to R&D expenditure a share of GDP comparable to the European average, in fact between 2006 and 2016 it was the country that more than any other reduced the share of

<sup>11</sup> The data relative to the Icelandic investment in education and R&D presented in this section are predominantly gathered from the Eurostat Database (see Eurostat 2018).

added value destined to this sector. From 2008 to 2015, Iceland, together with Romania, is the country that recorded the most marked drop in the contribution of the private sector to the financing of R&D activities, equal to 34 percent. However, the declining private expenditure on R&D was not offset by the public sector, if we consider that the share of government budget outlays on research and development has become increasingly marginal. In fact, from 2009 to 2016, the Icelandic government is the one, among Western countries, that less than any other increased the resources allocated to R&D activities in relation to its budget. In fact, the share has decreased by 40.2 percent.

The declining expenditure on the development and reproduction of scientific skills has been accompanied by the parallel stagnation of the employment of skilled labor in manufacturing and knowledge-intensive sectors. As highlighted by Figure 16, between 2008 and 2017, employment in medium- and high-technology manufacturing sectors and knowledge-intensive service sectors as a percentage of total employment has remained virtually unchanged at 1.3 percent. This means that in 2017 little more than one worker in a hundred was employed in technologically advanced sectors – one of the lowest values among high-income countries together with Greece.

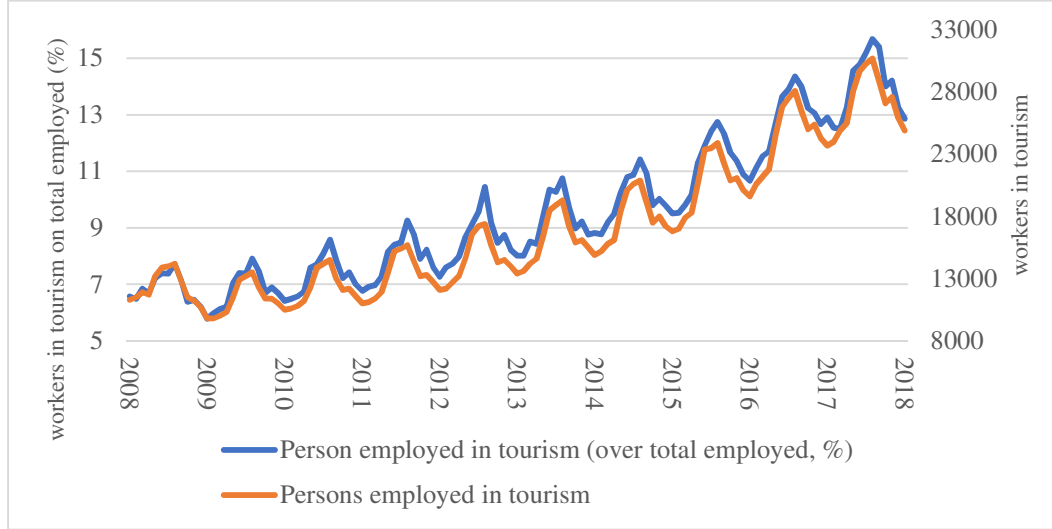
Figure 16. Employment in high and medium-high technology manufacturing sectors and knowledge intensive service sectors (% of total employment)



Source: Eurostat (2018).

The stagnation of high-skilled employment was mirrored by a staggering increase in employment in tourism, which traditionally tends to have a higher proportion of unskilled workers than the tradable commodities sector (Cooper et al. 1993; Sutherland and Stacey 2017, p. 14; Nowak et al. 2003, p. 255). As shown in Figure 17, employment in tourism has more than doubled in both absolute and relative terms during recovery period, so much so that in 2017, 15 out of 100 people were employed in this sector.

Figure 17. Person employed in tourism (total and over total employed,%)



Source: Authors' elaboration from Statistics Iceland (2018a).

The relatively good employment opportunities for unskilled people resulted in the creation of a distorted system of incentives that discourage individuals from advancing their education. Indeed, evidence suggests that rich employment opportunities in tourism are positively correlated with students' decision to prematurely leave education, to such an extent that 19 percent of 25-34 year-olds were without upper secondary education in 2017, one of the highest ratio in the OECD (OECD 2018b, p. 2).

The marginality of technologically advanced sectors within the Icelandic economic structure is positively correlated to the lack of technical skills applicable to the production processes among high school students – skills necessary to effectively use the most advanced work tools once they have entered the labor market. From 2008 to 2016 the proportion of new entrants to vocational science-oriented programs on the total of new entrants at the upper secondary level has decreased from 18,4 to 17,1 percent. In practice, the strengthening of the labor-intensive characteristics of the Icelandic economy has reduced the demand for the technical skills necessary for the efficient use of technologically advanced means of production.

This indirectly confirms that the increase in the level of wages and incomes during the period of the “miraculous recovery” is the result of a productive regression towards an intrinsically labor-intensive and low-skilled sector, dependent on the increased attractiveness of Iceland as a unique destination for “luxury” tourism. In the absence of the tourism boom, the growth of real wages combined with the inability to compete in high value-added sectors would have inevitably triggered a significant deterioration of the country's external balance.

## 5. Conclusions

In this article, we have argued that the tourism-led growth model that Iceland has pursued over the past decade has been able to guarantee, at least momentarily, the return to full employment, sustained economic growth and low inflation. Unfortunately, this

apparent success story presents marked elements of fragility. In spite of the rhetoric about the presumed interventionist attitude of the Icelandic authorities, these have reinforced the country's tendency to specialize in low-skilled sectors, such as tourism. This is firstly testified by the passivity shown by the authorities in the face of a currency appreciation that has severely penalized most of the tradable sector; and secondly by the dynamics of public expenditure on education, vocational training and research and development, which led to the stagnation of technological development in Iceland. The most striking result of this *laissez-faire* approach is the involution of the export sector, where the bulk of skilled labor is usually concentrated (Leontief 1956): the export share of goods to the GDP declined from 32,9 to 20,6 percent over the 2011-2017 period. Worse yet, this *laissez-faire* model is simply not appropriate to the task of guarantying sustainable growth under the competitive conditions of technologically advanced capitalism. The widening mismatch between the average skill level and real wages of the work-force inevitably led to an overvaluation of the real exchange rate, compared to the value that in the long term would permit the maintenance of an external balance.

According to the model we propose, in the long run, the compatibility of high full employment, high wages and profits, price stability and external balance can only be guaranteed by a reorientation of the country's productive structure towards sectors with higher added value. The crucial economic-political requirements for a successful renewal is the formulation of a set of monetary and fiscal policies that reassert an extensive role of the state in shaping the direction of economic expansion. Such an approach dictates a two-part course of action:

(1) encouraging the adoption of a more competitive real exchange, which could be achieved by an effective management of capital flows coupled with simultaneous sterilized interventions in the foreign exchange market by the central bank. Since a real depreciation implies a lower purchasing power of domestic output vis-à-vis international output, this monetary policy is expected to have a contractionary effect on real wages in the short run. Yet, since productivity gains are often greater in the tradable sector than in the non-tradable sector, it is likely that in the medium term a devaluation of the domestic currency will tend to produce a growth rate of real wages more in line with current account sustainability (Frenkel and Rapetti 2015). This is especially true when the country increases its competitiveness in the more technologically sophisticated branches and segments of the tradable sector.

(2) increasing the scientific-technical potential of the economic system, which in turn is closely bound up with the rapid improvement of the scientific sophistication of national labor resources. Given the partial ineffectiveness of market forces as a method of stimulating higher educational attainment, the state should intervene to increase the demand for a highly qualified workforce. This goal can be concretely achieved through adequate fiscal policy tools that redirect resources away from low-tech sectors (such as tourism and real estate) to new branches of production lying on the technological frontier. Since "market prices cannot reveal the profitability of resource allocations that do not yet exist" (Rodrik 2008, p.104), government subsidies might contribute to foster innovative investments that may otherwise be deterred by a high risk of failure. Finally, mounting employment opportunities in new, non-traditional industries might set in motion a process of cumulative causation. In this process, increased demand of complex skills exerts an

upward pressure on quality manpower's wages that acts as a stimulus for individuals to increase their investment in education. This dynamic finds expression in an upward spiral of human capital accumulation at the national level which, in its turn, underpins the technological upgrading of the economy.

To conclude, an alignment of the productive structure with the actual level of real wage and external equilibrium is still possible for Iceland on the basis of very different policies from those relying almost entirely upon undirected market mechanisms.

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## APPENDIX 1

This appendix explains in more detail the method we used to determine the specific real wage level that would make the rate of profit equal to the actual rate, under the assumption that output, consumption and investment prices all grow at the same rate ( $\Delta PGDP = \Delta PC = \Delta PI$ ). To do this, we needed to determine an hypothetical state of affairs, which we called ‘hypothetical scenario n.2’. This can be defined as a situation in which:

- prices are rising or falling as in the hypothetical scenario discussed in the article;
- however, the rate of profit equals the actual scenario’s rate of profit;

The hypothetical scenario n.2 differs from the actual and hypothetical scenario, in that it is characterized by different levels of real wage and, thus, profit share. This table summarizes the main differences among the actual scenario, hypothetical scenario n.1, and hypothetical scenario n.2.

Table 1. Actual vs. Hypothetical scenario n1 vs. Hypothetical scenario n2.

	<i>Actual scenario</i>	<i>Hyp. scenario (H.1)</i>	<i>Hyp. scenario n.2 (H.2)</i>
<b>Inflation rates</b>	$\Delta PGDP \neq \Delta PC \neq \Delta PI$	$\Delta PGDP = \Delta PC = \Delta PI$	$\Delta PGDP = \Delta PC = \Delta PI$
<b>Profit rate</b>	$r$	$r_{H1} \neq r$	$r_{H2} = r$
<b>Real hourly wage</b>	$W$	$W_{H1} = W$	$W_{H2} \neq W$
<b>Wage share</b>	$WSH$	$WSH_{H1} \neq WSh \neq WSh_{H2}$	$WSh_{H2} \neq Wsh \neq WSh_{H1}$
<b>Profit share</b>	$PSH$	$PSh_{H1} \neq PSh \neq PSh_{H1}$	$PSh_{H2} \neq Psh \neq PSh_{H2}$

*Note:* PGDP=GDP price deflator; PC=private consumption deflator; PI=investment goods price deflator

In order to determine the actual wage which, in the hypothetical situation n.2, would make the rate of profit equal the actual rate of profit, we firstly determined the corresponding profit share. We call this variable ‘hypothetical profit share n.2’ ( $PSh_{H2}$ ). By assuming that the actual profit rate is the same as the one in the hypothetical scenario n.2 ( $r = r_{H2}$ ):

$$r_{H2} = r = PSh_{H2} \times \frac{Y}{K_{Hyp}}$$

$PSh_{H2}$  can be calculated as follows:

$$PSh_{H2} = r \div \frac{Y}{K_{Hyp}}$$

Since the profit share is 1 minus wage share, we can easily calculate the corresponding hypothetical wage shares ( $W_{Sh_{H2}}$ ). By assuming that the levels of output and employment are exogenously given, we can estimate the nominal wage that needs to be paid to workers in order for them to obtain the wage share of hypothetical situation n.2. This nominal wage, which is called  $W_{n_{H2}}$ , can be calculated as follows:

$$W_{n_{H2}} = \frac{W_{Sh_{H2}} \times Y}{EMPH}$$

Where: EMPH is total hours of work.

$W_{n_{H2}}$  is defined as the nominal wage which makes the rate of profit equal to the actual rate of profit. Next, we estimated the actual hourly nominal wages by dividing the total hours of work to the total mass of nominal wages. Then, we converted the nominal actual hourly wage and the  $W_{n_{H2}}$  into real hourly wages (in 2005 ISK). For this purpose, the former was deflated by the GDP deflator. The latter, instead, was deflated by a virtual deflator, which has been assumed to be equal to the private consumption deflator (PC) in the first quarter of the base year (Q12014), while its growth rate has been assumed to be identical with the growth of GDP deflator over the entire period under consideration (Q12014-Q42017). Finally, we calculated the actual real hourly wage in relation to the real hourly wage of hypothetical situation n.2 ( $W_{H2}$ ), i.e. the real hourly wage that, given  $\Delta PGDP = \Delta PC = \Delta PI$ , makes profits equal to the actual ones.