

# The Impact of World War I on Sweden's Foreign Trade and Growth\*

Peter Hedberg  
*Uppsala University*

## ABSTRACT

During the early years of the World War One neutral countries' trade was not targeted by naval warfare and economic blockades, while belligerents' trade plummeted. Studies have generally found that neutral trade escaped some of the worst effects of the war. This article examines the impact of the war on the Swedish economy. It compares Sweden's wartime economic experience with those of the belligerents and uses interrupted time-series analyses of Swedish trade volumes, prices and real GDP growth. The results accord with previous research in that the neutral Scandinavian countries (Denmark, Norway, and Sweden) experienced two diametrically opposing trends during the war: up to 1916 their trade increased, which, for Sweden, boosted GDP growth. But after 1916, when naval and economic warfare intensified and finally brought international commerce to a standstill, trade and GDP growth in both belligerent and neutral countries were seriously hampered. In the literature, it has been suggested that naval warfare and blockade policies induced a shift from international to intra-regional-Scandi-

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navian trade. This may have alleviated the worst effects of the naval warfare and blockades, but this article finds that neither the trade expansion during the early years of the war nor neutral intra-regional and Baltic Sea trade sufficed to offset the international trade contraction recorded during the blockade years.

## I. Introduction

Most scholars agree that WWI, like other major conflicts, hampered economic growth and progress globally.<sup>1</sup> Not only did the war impose immense direct costs in the form of lives lost and material resources destroyed, but naval warfare and economic blockades also disrupted and distorted international trade and the overall pattern of production and consumption. The changing conditions were evident in slowing growth rates.<sup>2</sup> However, studies have also found that neutrals, as well as countries that had entered the war but were distant from the actual fighting, were less negatively affected than those heavily engaged in the war.<sup>3</sup> The neutral Scandinavian countries (Denmark, Norway, and Sweden), for example, were among those that managed to expand their foreign trade during the early years of the war.<sup>4</sup> Although this increase was temporary, it was very substantial and thus possibly significant for Scandinavian economic

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<sup>1</sup> On the impact of WWI on the economy, see for instance Broadberry and Harrison (2005), *The Economics of World War I*; Glick and Taylor (2010), *Collateral damage*; Blum et al. (2012), *Organization of War Economies*; Gowa and Hicks (2015), *Commerce and Conflict*.

<sup>2</sup> Findlay and O'Rourke (2007), *Power and Plenty*, pp. 435-443.

<sup>3</sup> Neutral countries in Europe, such as Spain, Switzerland, and the Netherlands, experienced trade expansion during the first years of the war. On Spain's wartime trade, see Pinilla and Serrano (2008), *The Agricultural and Food Trade in the First Globalization*, p. 135; on Switzerland's, see Müller et al. (2008), *Coping with barriers to trade*, p. 34; on the Netherlands', see de Jong (2005), *The Dutch Economy during World War I*, pp. 138-140, 144. But trade also increased in distant belligerents such as Australia, Canada, the United States and South Africa, and as well as in India. Findlay and O'Rourke (2007), *Power and Plenty*, pp. 431-432; Hautcoeur (2005), *The Economics of World War I in France*, p. 121.

<sup>4</sup> Schön (2010), *Sweden's Road to Modernity*, pp. 243-246; Hansen (1977), *Økonomisk vækst i Danmark*, p. 9; Knutsen (1999), *Norway in the First World War*, pp. 43-58.

growth. By examining the impact of the war on Sweden's foreign trade and GDP growth over the span 1905-1930, this article aims to contribute to the literature on the Great War's effects on the economies of neutrals.

The investigation proceeds as follows. Section II offers a brief overview of previous research regarding the war's impact on the international economy, and more specifically on trade and GDP growth. Section III turns to the general economic conditions prevailing in Scandinavia during the war and to the development of Scandinavian foreign trade. The focus is on Sweden, although a Scandinavian picture is sketched in relation to the belligerents (i.e. the Entente and the Central Powers). Section IV then sets out the empirical analyses of the economic impact of WWI. From the standpoint of neutral trading countries, the war was divided into two distinct phases: expansion followed by contraction. These two phases probably affected Swedish trade and GDP growth in opposite way. If so, what was the net effect: did the downswing in international trade after 1916 crimp Swedish trade and GDP growth, or had the earlier trade expansion been sufficient to dominate the subsequent contraction? In order to estimate both the contemporaneous and long-term impact of the war on the volume and prices of Swedish imports and exports, interrupted time-series analyses are conducted. These estimates are also used to examine the war's impact on Sweden's real GDP growth rates. Section V concludes.

## II. The impact of the Great War on the international economy

In the period before 1913, world trade grew at an annual average rate of 3.3 per cent, compared with 1.6 per cent in the years 1913-1920.<sup>5</sup> Several interconnected factors relating to industrialisation drove the strong pre-war growth of trade. International mobility of factors of production was high, and could be observed in large-scale

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<sup>5</sup> Aldcroft (1978), "The end of the old regime", chapter 1.

movements of labour and capital from Europe to an increasing number of markets.<sup>6</sup> Technological advances in transport, established liberal trade policies and commercial treaties,<sup>7</sup> and a well-functioning international payments system, based on the gold standard and backed by London and a number of cooperating European central banks, facilitated international trade and economic development.<sup>8</sup> As a result, most economies experienced unprecedented growth before the outbreak of the war. World War I brought changes that altered these conditions more or less fundamentally. In this sense, it interrupted processes that were sensitive to disruptions in similar ways to what had transpired during the Napoleonic Wars.<sup>9</sup>

The long-term changes are well known. For example, there were rapid alterations of great magnitude in production and consumption patterns.<sup>10</sup> World manufacturing output declined, and new industrial and financial centres emerged at the expense of old ones. The war also transformed the way countries managed their economies.<sup>11</sup> Financial systems were redesigned unilaterally, often without any international policy coordination, capital markets became more restricted, trade less open, and money and exchange rates faced new challenges both during WWI and in the interwar period.<sup>12</sup> These changes concerned practically all parts of society and help to explain why the effects of the Great War are considered to have been so powerful.

The war was an accelerator of change. Fought on an unparal-

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<sup>6</sup> Feinstein et al. (2008), *The European Economy between the Wars*, chapter 2.

<sup>7</sup> See for instance Irwin (1993), "Multilateral and Bilateral Trade Policies", pp. 90-119; Capie (1983), "Tariff protection and economic performance".

<sup>8</sup> Eichengreen and Flandreau (2008), "The rise and fall of the dollar, or when did the dollar replace sterling as the leading international currency?", pp. 4-10.

<sup>9</sup> On the impact of the Napoleonic Wars on the economy, see for instance Heckscher (1964), *The Continental System*; Frankel (1982), *The 1807-1809 Embargo against Great Britain*; Crouzet [1964], *Wars, Blockade, and Economic Change in Europe*; O'Rourke (2006), *The Worldwide Economic Impact of the French Revolutionary and Napoleonic Wars*.

<sup>10</sup> Feinstein et al. (2008), *The European Economy between the Wars*, chapter 2.

<sup>11</sup> Findlay and O'Rourke (2007), *Power and Plenty*, p. 435.

<sup>12</sup> On the monetary and financial market conditions, see for instance Eichengreen (1995), *Golden Fetters*, chapter 1.

leled scale, its costs and the depth and length of its impact exceeded those of previous wars – at least in the warring countries. The Great War had all the features of a total war, with the belligerents engaged in a complete mobilisation of their resources.<sup>13</sup> Since all resources may be employed in order to strengthen the war effort, the concept of total war makes no sharp distinction between civilian and military resources. In order to deny each other resources, the Central Powers and the Entente instituted blockades as essential measures of warfare. From 1917 onwards, the major European trade channels were under blockade. The remaining channels of trade were reallocated to the members of the respective alliances and to neutrals, entailing a shift in – or regionalisation of – the geographical pattern of trade.<sup>14</sup>

The direct costs of the war – measured in killed and wounded and material destruction – were unprecedented.<sup>15</sup> In addition, its indirect costs were enormous. According to Glick and Taylor (2010), the costs arising from disrupted channels of international economic exchange, dislocated markets, and distortions in the overall pattern of production and consumption equalled or, in some countries, even exceeded the direct costs.<sup>16</sup> Since most industrial countries depended on international trade for economic growth and development, as did an increasing number of industrialising countries, the disruption of trade had a strongly adverse effect on economic growth.

Still, the impact of the war differed from country to country, depending on several factors such as their distance from the hostilities and how well they managed their resources.<sup>17</sup> In the literature, the mainstream view is that the economies of the belligerents, which ac-

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<sup>13</sup> See Chickering and Förster (eds.) (2000), *Great War, Total War. Combat and Mobilization on the Western Front, 1914-1918*, especially chapter 1 by Förster, for a concise treatment of the concept of total war applied to WWI.

<sup>14</sup> Gowa and Hicks (2015), *Commerce and Conflict*, pp. 10-11.

<sup>15</sup> Contemporary works on the costs of WWI include: Keynes (1919), *The Economic Consequences of the Peace*; Bogart (1920), *Direct and Indirect Costs of the Great World War*; and Bowley (1930), *Some Economic Consequences of the Great War*.

<sup>16</sup> Glick and Taylor (2010), "Collateral damage: trade disruption and the impact of war".

<sup>17</sup> Broadberry and Harrison (2005), *The Economics of World War I*, chapter 1; Kennedy (1988), *The Rise and Fall of the Great Powers*, p. 279.

counted for the highest direct and indirect costs, were hit hardest. This was evident in the GDP growth rates, which were lower in belligerent than in neutral countries.<sup>18</sup> One of the main reasons for this, according to Gowa and Hicks (2015), is that neutral trade was less affected by naval warfare and blockades. For instance, while continental foreign trade declined sharply during the war, the ratio of exports to GDP actually increased in most neutral countries.<sup>19</sup>

### III. Trade and growth in Scandinavia

Like other small countries such as Denmark, Norway, the Netherlands, Spain, and Switzerland, Sweden adopted a policy of neutrality during the war. When the war broke out, neither Sweden's sovereignty nor its vital interests were at immediate risk. Militarily, the country was weak, and an armed conflict with a great power was more than likely to end in disaster. Furthermore, Sweden had enduring historical ties with Germany and depended on Germany and Great Britain economically. In 1912, Germany accounted for more than a third of Sweden's imports and a fifth of its exports, while Britain supplied about a quarter of its imports and took a quarter of its exports.<sup>20</sup> Although relations between Sweden and the two warring blocs became more and more tense as the war wore on, they remained relatively good.<sup>21</sup> Apart from a diplomatic dispute with Russia concerning the Åland Island ("The Åland Island Cri-

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<sup>18</sup> The growth rates were higher on average in neutral countries, for example in the Netherlands (3.6 per cent per annum, 1913-1929) and Norway (2.9 per cent). Among the neutrals, Sweden had the lowest GDP growth rate. Its rate was equal to that of France (1.9 per cent), which was highest among the belligerent countries, while Austria and the UK had the lowest rates (0.3 and 0.7 per cent, respectively). Feinstein et al. (2008), *The World Economy between the Wars*, p. 17.

<sup>19</sup> Gowa and Hicks (2015), "Commerce and Conflict: New Data about the Great War", pp. 4, 16.

<sup>20</sup> Statistics Sweden (1914), *Annuaire Statistique de la Suède*, table IX: "Valeur de l'importation et de l'exportation".

<sup>21</sup> Carlgren (1995), "Sweden, the Great Powers and the Baltic, 1890-1914", pp. 9-10.

sis"),<sup>22</sup> Sweden never experienced serious political friction with any foreign power during the war.

In 1914, when hostilities began, Sweden appeared fairly well positioned to avoid being drawn into the conflict. Swedish naval forces controlled the country's territorial waters and had relatively open access to the German ports. Moreover, Sweden controlled trade routes that supplied Russia with goods and matériel from Russia's allies. Before the blockade years, trade and shipping were not vulnerable.<sup>23</sup> While the belligerents' trade declined immediately after the outbreak of hostilities, in the early part of the war neutrals had great opportunities to increase their exports of essential commodities and raw materials.<sup>24</sup> According to Schön (2010), Swedish export industries benefited from increasing international demand for such goods as iron ore, iron and steel, timber, and ball bearings,<sup>25</sup> which were vital to the arms industries of both the Entente and the Central Powers. In Sweden, it was thought that this would induce the belligerents to maintain a benevolent or at least a cautious stance toward Sweden.<sup>26</sup>

However, naval warfare and blockades escalated successively from the spring of 1915 onwards. While Germany launched an unrestricted submarine offensive that targeted both enemy and neutral vessels,<sup>27</sup> the British moved from a "restricted" blockade, which allowed neutral vessels to call at enemy ports as long as they did not carry contraband, to a "strict" blockade specifically aimed against enemy commerce. Accordingly, Scandinavian merchant vessels bound for any of the Central Powers were regarded as enemy ships.<sup>28</sup>

<sup>22</sup> On the Åland Crisis, see Rystad (1995), "The Åland Islands Question and the Balance of Power in the Baltic during the First World War".

<sup>23</sup> Hedberg and Karlsson (2015), "Neutral trade in time of war", p. 67.

<sup>24</sup> Pinilla and Serrano (2008), "The Agricultural and Food Trade in the First Globalization", p. 135; Müller et al. (2008), "Coping with barriers to trade", p. 34; de Jong (2005), "The Dutch Economy during World War I", pp. 138-140, 144.

<sup>25</sup> Schön (2010), *Sweden's Road to Modernity*, pp. 235, 239.

<sup>26</sup> Carlgren (1995), "Sweden, the Great Powers and the Baltic, 1890-1914", pp. 9-10.

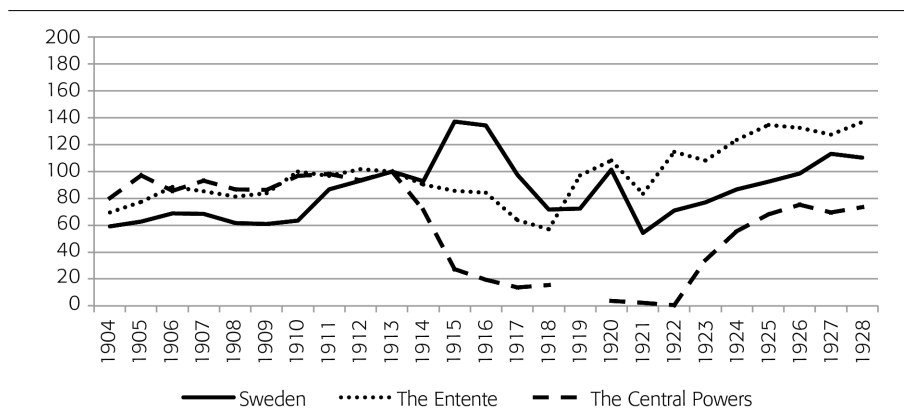
<sup>27</sup> Davis and Engerman (2006), *Naval Blockades in Peace and War*, p. 165.

<sup>28</sup> Hardach (1977), *The First World War*, pp. 23-27; Halpern (2006), *World War I*, pp. 98-103.

In 1917, the United States and Great Britain tightened the blockade further by proclaiming an embargo against all neutral countries.<sup>29</sup> The ensuing drop in international commerce, which lasted several years after the hostilities had ceased, was substantial for all trading countries, the Scandinavian countries included.<sup>30</sup>

Figure 1 compares the growth of Swedish export volumes with those of the belligerent countries, highlighting the relatively favourable performance of Sweden's exports. As the members of the Central Powers and the Entente had been each other's leading trading partners, the blockades put in place entailed a loss of their major markets. Consequently, the decline in their trade was sharpest.<sup>31</sup> Once the war began, the export volumes of both blocs experienced an immediate slump (16 per cent in the case of the Entente, 81 per cent for the Central Powers), while the volume of Sweden's exports grew by over 30 per cent between 1913 and 1916. Instead, over the

**FIGURE 1**  
Belligerent and Swedish real export indices during WWI (1913 = 100)



Sources: Mitchell (2003), table E1 and H2 (2013); Edvinsson et al. (2010), table A7:23.  
 Note: The Entente comprised France, Great Britain, Italy, Belgium, Greece, and Portugal, while the Central Powers comprised Germany, Austria-Hungary and the Ottoman Empire.

<sup>29</sup> Hobson et al. (2012), "Scandinavia in the First World War", pp. 31-33.

<sup>30</sup> Hardach (1977), *The First World War*, pp. 23-27; Halpern (2006), *World War I*, pp. 98-103.

<sup>31</sup> Gowa and Hicks (2015), "Commerce and Conflict", pp. 13-14.

whole arc of the war the real volume of exports of the members of the Entente and the Central Powers fell by 43 and 85 per cent respectively, while that of Sweden declined by 28 per cent.

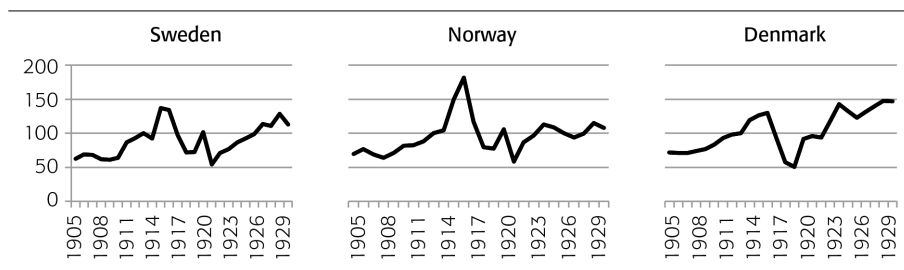
Compared with Great Britain, France and Germany, most neutral countries were backward and small. Their policy stances differed depending on their geopolitical interests, political power and traditions, and historical experience. Sweden had several characteristics in common with Denmark and Norway: they were all still mainly agricultural, although well on the way to becoming modern industrialised economies. Also, all three countries relied on access to foreign markets for economic growth and had significant shipping capacity; indeed, the Norwegian merchant fleet was the fourth largest in the world. All three therefore opted for liberal trade policies. Like the belligerents, the Scandinavians went over to emergency administration when the war broke out, although the share of their arms industries in the total economy was naturally smaller than in the warring countries.<sup>32</sup>

Figure 2 presents the growth of Scandinavian exports. To begin with, it confirms the observation by Schön (2010) and Hedberg and Karlsson (2015) that neutrals had opportunities, though temporary, to increase their exports during the war. All three countries experienced exceptional export growth until 1916.<sup>33</sup> Between 1905 and 1913, Scandinavian exports had expanded by between a third and a quarter, whereas in the first years of the war (1914-1916) Norwegian exports grew by fully 78 per cent and Danish and Swedish exports by 11 and 41 per cent, respectively. Secondly, Figure 2 illustrates the strong impact of naval warfare and blockades. While the trade of the Entente revived as soon as the war ended, Scandinavian trade contracted again in 1919. Between 1917 and 1919, exports dropped

<sup>32</sup> On the characteristics of and developments in the Scandinavian countries, see Salmon (1997), *Scandinavia and the Great Powers 1890-1940*, chapters 1-4, and Hobson et al. (2012), *Scandinavia in the First World War*, chapter 1.

<sup>33</sup> Schön (2010), *Sweden's Road to Modernity*, pp. 243-246; Hedberg and Karlsson (2015), "Neutral trade in time of war", p. 67; Hansen (1977), *Økonomisk vækst i Danmark*, p. 9; Knutsen (1999), "Norway in the First World War", pp. 43-58.

**FIGURE 2**  
Real export indices of the Scandinavian countries, 1905-1930 (1913 = 100)



Source: Mitchell (2003), table E1. CPI deflator from Mitchell (2003), table H2.

below the 1913 levels. Hardach (1977) and Hobson (2012) have argued that, during the blockade years, neutral intra-regional trade and trade in the Baltic region – especially trade with Germany – offered an alternative to the transoceanic markets.<sup>34</sup> This can be seen in the more than sixfold wartime expansion of trade between the Central Powers on one side and the Netherlands and Scandinavia on the other.<sup>35</sup> But Figure 2 also shows that intra-regional trade never increased fast enough to keep trade at 1913 levels; it did not become a sufficient substitute for transoceanic markets. While the Scandinavian countries supplied foodstuffs, timber, fertilisers, precious metals, and ores, they still depended on the international market for imports of such staples as grain and fuels.<sup>36</sup>

When international trade resumed after the war, Danish and Norwegian exports recovered, and by 1923-24 they surpassed their 1913 levels, a feat which Swedish exports did not accomplish until 1927. However, Sweden's slow post-war export growth depended more on domestic factors than on international trading conditions.<sup>37</sup>

<sup>34</sup> Hardach (1977), *The First World War*, p. 29. The Scandinavian share of Danish imports and exports, for example, increased by one quarter and one third, respectively, between 1916 and 1918. Hobson et al. (2012), *Scandinavia in the First World War*, p. 31.

<sup>35</sup> Gowa and Hicks (2015), "Commerce and Conflict", p. 4, 16.

<sup>36</sup> Hardach (1977), *The First World War*, p. 29.

<sup>37</sup> On the deflationary crisis, see for instance Balderston (2003), Introduction: "The 'deflationary' bias of the interwar Gold Standard". The early 1920s were characterised by

#### IV. The impact of the war on Sweden's trade and GDP growth

I will now examine the impact of the war on Swedish trade, using multiple interrupted time-series analysis.<sup>38</sup> The impact on the volume and prices of Swedish imports and exports was estimated with the following equation:

$$Y_t = \beta_0 + \beta_1 Trend_t + \beta_2 War\ level_t + \beta_3 War\ trend_t + \beta_4 Peace\ level_t + \beta_5 Peace\ trend_t + \varepsilon_t \quad (1)$$

where *Trend* represents a dummy variable counter of time from 1 to *N*, *War level* (wartime real trade levels) a dichotomous dummy variable scored 0 for each year before the outbreak of war and 1 for each year thereafter, *War trend* a dummy variable counter scored 0 before the outbreak of war and 1, 2, 3... thereafter, *Peace level* (peacetime real trade levels) a dichotomous dummy variable scored 0 before and during war and 1 thereafter, and *Peace trend* a dummy variable counter scored 0 before and during war and 1, 2, 3... thereafter. The model can be viewed as a piece-wise linear regression model, and is intended to capture any possible shifts in either the level (intercept) or trend (slope) of the regression line as a result of the onset of World War I. The coefficients  $\beta_2$  and  $\beta_3$  are thus meant to capture changes in the level and/or trend of Sweden's trade volume and prices during the war compared with the pre-war period (i.e. coefficients  $\beta_0$  and  $\beta_1$ ), while coefficients  $\beta_4$  and  $\beta_5$  capture changes in the post-war period compared with the war years.

In all the analyses, the real effective exchange rate (REER) vis-à-vis Sweden's largest trading partners is adopted as a control variable. Two separate Swedish REER indices have been constructed

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poor profitability, high unemployment (up to 25 per cent), and rising wages. The export industries were depressed by a deflationary crisis that took hold of Sweden from 1921 onwards. According to Schön, the crisis exposed structural tensions between old and new segments, which eventually triggered a large-scale rationalisation of Swedish industry. Schön (2010), *Sweden's Road to Modernity*, pp. 260-261.

<sup>38</sup> The analysis draws on Lewis-Beck and Alford (1980), "Can Government Regulate Safety?"; Anderton and Carter (2001), "The Impact of War on Trade"; and Barbieri and Levy (1999), "Sleeping with the Enemy".

with data on exchange rates collected from Edvinsson et al. (2010), one import-weighted and one export-weighted (geometric), using statistics from tables E2 and H2 in Mitchell (2003) in order to assign the weights of different trading partners and for data on domestic price levels. In the analyses of trade volumes, a Swedish average import tariff index was used as an additional control variable in the case of imports and a European average import tariff index in the case of exports. These indices were constructed using data from table G6 in Mitchell (2003) and table IX in Statistics Sweden (1905-1930).

The interrupted time-series models were estimated with a two-stage GLS regression, in which the regression equations were first estimated using OLS. All of the variables were then transformed using the autocorrelation coefficient obtained, whereupon the regression equations were re-estimated using the transformed variables. Table 1 displays the coefficient estimates derived from the interrupted time-series analyses.

The estimates for WWI show that the war provoked a decline of around 25 per cent in Swedish import volumes, while Swedish real exports appear to have been unaffected. The latter finding is due solely to the fact that wartime export growth does not display a linear trend. As noted above, the growth in Sweden's export volumes during the early years of the war was nearly as steep as their decline towards the end of the war. Again, as Schön argued, the early years of the war saw an almost unprecedented expansion in Swedish exports, which grew by some 60 per cent between 1913 and 1915 (Figure 2). But from 1916 onwards Swedish (and Scandinavian) trade plummeted. A case could thus be made for dividing the time-series covering the war into two segments, one capturing the early years (1914-1915), when the conditions for Swedish trade were still favourable, the other the latter part of the war (1916-1917), when trade ground to a halt. In this revised analysis, WWI is estimated to have caused an increase in Swedish real exports of around 12 per cent per annum during the early years but to have depressed them by around 28 per cent per annum in 1916 and 1917.

As to import and export prices, WWI had a positive contempo-

**TABLE 1**  
**Regression results. Impact of WWI on Swedish**  
**trade volumes and prices, 1914-1918**

		WW I
IMPORT VOLUME	Trend	0.028** (3.37)
	War level	0.477* (2.69)
	War trend	-0.260*** (-4.32)
	Peace level	-0.723** (-2.97)
	Peace trend	0.687*** (6.14)
EXPORT VOLUME	Trend	0.054*** (11.49)
	War level	0.062 (0.36)
	War trend	0.010 (0.13)
	Peace level	-0.069 (-0.30)
	Peace trend	-0.026 (-0.18)
IMPORT PRICES	Trend	0.009 (0.95)
	War level	-0.412* (-2.31)
	War trend	0.332*** (5.68)
	Peace level	1.358*** (5.81)
	Peace trend	-0.366 (-1.36)
EXPORT PRICES	Trend	0.015 (1.48)
	War level	-0.506** (-3.26)
	War trend	0.515*** (16.63)
	Peace level	-0.017 (-0.04)
	Peace trend	-0.071 (-0.30)

\*\*\* Significant at the .1% level, \*\* Significant at the 1% level, \* Significant at the 5% level.

Sources: Mitchell (2003), table E1; Statistics Sweden (1915-1920), table IX: "Valeur de l'importation et de l'exportation".

aneous impact on Sweden's terms of trade. It caused both import and export prices to rise, the latter effect being significantly larger, with an increase of more than 25 per cent in Sweden's terms of trade. The stimulus that this may have provided to the export sector possibly offset some of the effects of the intensification of naval warfare and blockades. By contrast, from 1916 onwards the decline in Sweden's terms of trade more than offset the gains of the previous year.

The analyses presented below address the war's long-term impact on the Swedish economy. The effects of the war are extracted from the interrupted time-series model by comparing the estimated import or export volume/price level for a given post-war year with the counterfactual for that same year (i.e. the estimated import or export volume/price level had the war not occurred). The import or export volume/price level in post-war year  $N$  is estimated with the following equation:

$$Y_N = \beta_0 + \beta_1 * N + \beta_2 + \beta_3 * N_w + \beta_4 + \beta_5 * N_p \quad (2)$$

where  $N$  represents the number of observations up to the year of interest,  $N_w$  the number of observations from the outbreak of war up to the year of interest, and  $N_p$  the number of years from the end of the war up to the year of interest. The counterfactual is estimated by excluding the war and peace level and trend variables from the above equation:

$$Y_N = \beta_0 + \beta_1 * N \quad (3)$$

Consequently, the long-term effect, i.e. the difference between the estimated import or export volume/price level and the counterfactual, can be measured with equation (4) below:

$$\beta_2 + \beta_3 * N_w + \beta_4 + \beta_5 * N_p \quad (4)$$

However, obtaining a reasonably accurate estimate of the long-term impact of WWI with this method would require that the post-war period be shorn of other influences, such as the effects of the deflationary crisis mentioned earlier. To capture the influence of this crisis on the level and trend of Swedish import and export volume

and price levels, an additional set of level and trend variables were included in the analysis. Consequently, the peace level and trend variables of WWI only capture the impact up to 1920, the last year for which the long-term impact of the war can be estimated accurately. On this basis, Sweden's actual export volume was only about 57 per cent of the counterfactual level in 1920. The same pattern holds true for imports.

*The contribution of the war to Sweden's real GDP growth rates*

To obtain a more accurate measure of the broader impact of the war on Swedish economic development, the contribution of the effects of war to Swedish real GDP growth rates has been estimated. The estimation method is derived from the following simple definition of GDP:

$$GDP = C + I + G + (X - M) \quad (5)$$

where  $C$  represents private domestic consumption of goods and services,  $I$  domestic investments,  $G$  government spending, and  $X - M$  net exports. The contribution of each component to GDP growth during a given period was then estimated by dividing the change in the value of the components from one period to the next with the GDP of the preceding period. Since focusing on net exports means that import growth will tend to be interpreted as negative for GDP growth, this method often produces peculiar results. In reality, imports do not hamper economic growth. It is standard practice to subtract imports when calculating GDP, in order to exclude goods and services that are not domestically produced. But this does not mean that a rise in imports reduces GDP or vice versa; if anything, the opposite tends to be true.<sup>39</sup> Conversely, an increase in exports will boost (and a reduction curb) GDP growth, regardless of the development of imports. For this reason, the contribution of Sweden's wartime

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<sup>39</sup> To illustrate this point, the correlation between Swedish net real exports and real GDP growth for the period examined in this article is -.42.

trade volume to GDP growth has been calculated by dividing the change in real exports between time  $t$  and  $t - 1$  with the real GDP of time  $t - 1$ . To some degree, this overestimates the contribution of the war-induced trade volume to Swedish GDP growth, as there is always an import component of exports which has not been subtracted in the analysis. Still, this approach produces more reliable results than do alternative methods.

When it comes to the corresponding analysis of the war-induced price changes of imports and exports, I have used the standard method for calculating the contribution of changes in net barter terms of trade (NBTT) to GDP growth, whereby the percentage change in NBTT between time  $t$  and  $t - 1$  is multiplied by the export share of GDP at time  $t$ . These two measures have then been added to arrive at a composite estimate of the total war-induced contribution of foreign trade to GDP growth. The results are presented in Table 2. Note that all the figures in the right-hand columns refer specifically to the contribution of trade volume and price changes that were caused by the war.<sup>40</sup>

As can be seen in Table 2, the war's early years – the period of expansion – made an annual contribution to Swedish real GDP growth of 4.74 per cent, while its latter years – the period of contraction – reduced growth by 5.66 per cent per annum. To some extent, this result was expected, but the negative effects during the second

**TABLE 2**  
Contribution of WWI to Swedish real GDP growth rates, per cent

	Average Swedish real GDP growth			Average contribution of the war to Swedish real GDP growth		
	1914-15	1916-17	1918-20	1914-15	1916-17	1918-20
WWI	1.52	2.57	3.99	4.74	-5.66	-1.77

Sources: Mitchell (2003), International Historical Statistics, tables E1, E2, G2, and H2; Statistics Sweden (1915-1920), table IX: "Valeur de l'importation et de l'exportation"; Edvinsson et al. (2010), table A7:23.

<sup>40</sup> In the following, the contribution of trade to GDP refers to the contribution of war-induced trade volume and price changes to Swedish GDP growth rates.

phase were surprisingly deep. Taking the entire span of the war (the phases of both expansion and contraction), the long-term contribution of the war to Swedish GDP growth was negative in the period 1918-1920, reducing GDP growth by 1.77 per cent per annum. The war's overall impact on Swedish trade and growth was thus clearly negative.

#### IV. Conclusion

The analyses in this article lend support to the conventional view that World War I hampered both belligerent and neutral foreign trade. It is true that neutral countries were better off than were the belligerents, in that neutrals escaped the direct costs of the war. It is also true that during the first war years neutral trade was not targeted by naval warfare and blockades while belligerent trade plummeted. In those years the Scandinavian countries experienced a remarkable expansion of exports and an improvement in the terms of trade. As a result, the contemporaneous impact of the early phase of the war on Sweden's foreign trade and GDP growth was clearly positive. But during the blockade years, from 1916 onwards, Scandinavian foreign trade contracted sharply and the terms of trade deteriorated. Naval warfare and blockade policies induced shifts in the geographical pattern of trade. While international trade declined, intra-regional trade expanded, although overall trade volumes remained below pre-war levels. Perhaps the intra-regional re-allocation of trade to Scandinavia and the Baltic Sea regional alleviated some of the worst effects of the blockades and naval warfare, but the overall negative impact during the blockade years plainly outweighed the positive impact recorded during the early phase of the war. This illustrates the destructive force of naval warfare and blockades on the economy during the war. In Sweden, the war hampered trade and GDP growth at least until 1920.

Neutral trade no doubt reduced the trade-related costs of the war, which represented a major part of its indirect costs. From the

perspective of the belligerent countries, this implies – drawing on the Swedish experience – that the strategy of economic warfare faced a dilemma: on the one hand, allowing neutral countries to trade might have enhanced the military capacity of the enemy and extended the duration of the war, but, on the other, the stricter the blockade and the greater the distortion of trade, the higher the costs borne by the belligerents and the general costs of war.

## References

- ALDCROFT D. (1978), *The European Economy 1917-1970*, New York, St. Martin's Press.
- ANDERTON C.H., CARTER J.R. (2001), "The Impact of War on Trade: An Interrupted Time-Series Study", in *Journal of Peace Research*, vol. XXXVIII, no. 4.
- BALDERSTON T. (2003), "Introduction: The 'Deflationary Bias' of the Interwar Gold Standard", in Theo Balderston (ed.), *The World Economy and National Economies in the Interwar Slump*, New York, Palgrave Macmillan.
- BARBIERI K., LEVY J.S. (1999), "Sleeping with the Enemy: The Impact of War on Trade", in *Journal of Peace Research*, vol. XXXVI, no. 4.
- BLUM M. ET AL. (2012), "Organization of War Economies", in U. Daniel, P. Gatrell, O. Janz, H. Jones, J. Keene, A. Kramer, and B. Nasson (eds.), *1914-1918 online. International Encyclopedia of the First World War*, Berlin, Freie Universität Berlin ([http://encyclopedia.1914-1918-online.net/article/organization\\_of\\_war\\_economies/2014-10-08](http://encyclopedia.1914-1918-online.net/article/organization_of_war_economies/2014-10-08)).
- BOGART E.L. (1920), *Direct and Indirect Costs of the Great World War*, New York, Oxford University Press.
- BOWLEY A.L. (1930), *Some Economic Consequences of the Great War*, London, Thornton Butterworth.
- BROADBERRY S., HARRISON M. (2005), "The Economics of World War I: An Overview", in S. Broadberry and M. Harrison (eds.), *The Economics of World War I*, Cambridge, Cambridge University Press.

- CAPIE F. (1983), "Tariff protection and economic performance in the nineteenth century", in J. Black and A. Winters (eds.), *Policy and performance in international trade*, New York, St. Martin's Press.
- CARLGREN W. (1995), "Sweden, the Great Powers and the Baltic, 1890-1914", in G. Rystad et al. (eds.), *In Quest of Trade and Security: The Baltic in Power Politics 1500-1990*, II, Stockholm, Probus.
- CHICKERING R., FÖRSTER S. (2000), *Great War, Total War. Combat and Mobilization on the Western Front, 1914-1918*, New York, Cambridge University Press.
- CROUZET F. (1964), "Wars, blockade, and economic change in Europe, 1792-1815", in *Journal of Economic History*, vol. XXIV, no. 4.
- DAVIS L., ENGERMAN S. (2006), *Naval Blockades in Peace and War: An Economic History since 1750*, New York, Cambridge University Press.
- DE JONG H. (2005), "The Dutch Economy during World War I", in S. Broadberry and M. Harrison (eds.), *The Economics of World War I*, Cambridge, Cambridge University Press.
- EICHENGREEN B. (1995), *Golden Fetters. The Gold Standard and the Great Depression, 1919-1939*, New York, Oxford University Press.
- EICHENGREEN B., FLANDREAU M. (2008), "The rise and fall of the dollar, or when did the dollar replace sterling as the leading international currency?", *NBER Working Paper Series*, no. 14154.
- EDVINSSON R. ET AL. (2010), *Exchange rates, prices, and wages, 1277-2008*, Stockholm, Ekerlids förlag.
- FEINSTEIN C.H. ET AL. (2008), *The European Economy between the Wars*, New York, Oxford University Press.
- FINDLAY R., O'ROURKE K. (2007), *Power and Plenty. Trade, War, and the World Economy in the Second Millennium*, Princeton, Princeton University Press.
- FRANKEL J.A. (1982), "The 1807-1809 Embargo against Great Britain", in *Journal of Economic History*, vol. XLII, no. 2.
- GLICK R., TAYLOR A.M. (2010), "Collateral damage: trade disruption and the impact of war", in *The Review of Economics and Statistics*, vol. XCII, no. 1.
- GOWA J., HICKS R. (2015), "Commerce and Conflict: New Data about

- the Great War", in *British Journal of Political Science*, First View, published online 07 July 2015.
- HALPERN P.G. (2006), "The Blockade of World War I", in B.E. Elleman and S.C.M. Paine (eds.), *Naval Blockades and Seapower. Strategies and Counter-strategies, 1805-2005*, London and New York, Routledge.
- HANSEN S.A. (1977), *Økonomisk vækst i Danmark II: 1917-1975*, København, Akademisk Forlag.
- HARDACH G. (1977), *The First World War: 1914-1918*, London, Allen Lane, Penguin Books.
- HAUTCOEUR P.-H. (2005), "The Economics of World War I in France", in S. Broadberry and M. Harrison (eds.), *The Economics of World War I*, Cambridge, Cambridge University Press.
- HECKSCHER E.F. (1964), *The Continental System: An Economic Interpretation*, Gloucester, Mass., Peter Smith.
- HEDBERG P., KARLSSON L. (2015), "Neutral trade in time of war: The case of Sweden, 1838-1960", in *The International Journal of Maritime History*, vol. XXVII, no. 1.
- HOBSON R. ET AL. (2012), "Scandinavia in the First World War", in C. Ahlund (ed.), *Scandinavia in the First World War. Studies in the War Experience of the Northern Neutrals*, Lund, Nordic Academic Press.
- IRWIN D.A. (1993), "Multilateral and Bilateral Trade Policies in the World Trading System: An Historical Perspective", in J. De Melo and A. Panagariya (eds.), *New Dimensions in Regional Integration*, New York, Cambridge University Press.
- KENNEDY P. (1988), *The Rise and Fall of the Great Powers. Economic Change and Military Conflict from 1500 to 2000*, London, Unwin Hyman.
- KEYNES J.M. (1919), *The Economic Consequences of the Peace*, London, MacMillan.
- KNUTSEN J.N. (1999), "Norway in the First World War", in *Folia Scandinavia*, vol. V, no. 1.
- LEWIS-BECK M.S., ALFORD J.R. (1980), "Can Government Regulate Safety? The Coal Mine Example", in *American Political Science Review*, vol. LXXIV, no. 3.

- MITCHELL B.R. (2007), *International Historical Statistics: Europe, 1750-2005*, New York, Palgrave MacMillan.
- MÜLLER M. (2008), "Coping with barriers to trade: Causes and consequences of the changing competitiveness of Swiss industries, 1900-1950", Paper for the 12<sup>th</sup> Annual Conference of the EBHA Bergen, Norway, August 21-23.
- O'ROURKE K. (2006), "The worldwide economic impact of the French Revolutionary and Napoleonic Wars, 1793-1815", in *Journal of Global History*, vol. I.
- PINILLA V., VICENTE R. (2008), "The Agricultural and Food Trade in the First Globalization: Spanish Table Wine Exports 1871 to 1935", in *Journal of Wine Economics*, vol. III, no. 2.
- RYSTAD G. (1995), "The Aland Islands Question and the Balance of Power in the Baltic during the First World War", in G. Rystad et al. (eds.), *In Quest of Trade and Security: The Baltic in Power Politics 1500-1990*, II, Stockholm, Probus.
- SALMON P. (1997), *Scandinavia and the Great Powers 1890-1940*, Cambridge, Cambridge University Press.
- SCHÖN L. (2010), *Sweden's Road to Modernity*, Stockholm, SNS Förlag.
- STATISTICS SWEDEN (1905-1930), *Annuaire Statistique de la Suède*, Stockholm, Norstedts & Söner.

