

Exploiting the enemy: The economic contribution of POW labour to Nazi Germany during the Second World War

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Despite the unprecedented scale of 35 million captured prisoners of war (POWs) globally during the Second World War, very little has been written about the economic significance of their employment. This paper fills this gap by examining POW employment during the Second World War in Nazi Germany. More than 14 million forced labourers passed through the Reich from 1939 to 1945, of whom 4.6 million had been POWs. This paper for the first time quantifies the significant economic gain Nazi Germany derived from POW employment. It also examines the impact of POW transfers and treatment on occupied territories. Wartime labour dislocation and mistreatment of POWs in German hands amplified human capital losses for occupied countries.

Nazi Germany's war economy benefited from the size, mobility and favourable productivity of its POW workforce. French, Soviets and Italians provided the largest POW labour groups. POW worker treatment and productivity varied considerably according to racial ideology and labour demand. This paper applies economic analysis to produce the first time series of aggregate POW labour productivity. Also, this paper revises POW employment figures substantially upwards. Subsequently, these revised employment figures are combined with the previously attained productivity figures to produce a first estimate for the economic contribution of POW labour. The POWs at peak made up 5 per cent of the German workforce and contributed between 1 and 1.5 per cent to German GNP every year from 1940 to 1944. Labour transfers from occupied territories to the Reich played a key role in enabling this large scale economic contribution of POW labour to Germany which in turn severely harmed the occupied countries' economies. The exploitation of POW labour force therefore provided a key benefit to the German war economy which appears larger than previously assumed.

Keywords: forced labour, human capital, Labour productivity, Prisoners of War

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The POW apparatus has, given the duration of the war and the rising number of POWs, increased in significance for the war economy and the troop requirements. [...] It is thus crucial to maintain the POW labour power and to employ the POWs at the right moment according to their skills [...].

Direct order from Hitler, 30 May 1943¹

World War Two witnessed an unprecedented scale of POW maintenance and employment. An estimated 35 million POWs were captured by all sides.² This compared to between 7 and 8.5 million during World War One. Various scholars have emphasised the crucial economic role of POW labour for captors around the globe in the British Commonwealth, the US and the Soviet Union.³ This article sheds light on the economics of POW employment by Nazi Germany and its implications for the occupied territories. The Third Reich commanded a POW and forced foreign labour force massive in scale and scope; employing and transferring 4.6 million POWs and 10 million foreign civilian workers according to military and political goals and labour demand. These forced labourers substantially mitigated labour shortages in the German war economy. This process generated economic losses for occupied territories: Labour extraction and exploitation during wartime was a gain for Germany's war effort and a loss for the host economy. The treatment of POWs in German hands varied considerably and resulted in post war losses for each occupied country. The extent of these losses depended on the degree of economic exploitation and physical and psychological abuse that POWs were exposed to.

This paper draws upon previous historical works to conduct the very first analysis of the economic contribution of forced labour from occupied territories. Foreign civilian employment in German hands has been extensively studied while POW labour in German hands so far merely received attention as a sub-group or in regional studies.⁴ The scale of economic exploitation of the large masses of POWs held by Germany was unprecedented and has not yet been sufficiently quantified. POWs were

¹ Bundesarchiv-Militärarchiv Freiburg (BA-MA), Führerbefehl 30 May 1943. RW 48/v.12, in Hubert Speckner, *In der Gewalt des Feindes, Kriegsgefangenenlager in der "Ostmark", 1939-45*, (Vienna, 2003), 176

² Henri Michel, *The Second World War* (New York, 1975), 784

³ Bob Moore and Kent Fedorowich, *The British Empire and Italian Prisoners of War 1940-47* (Basingstoke, 2002); George C. Lewis and John Mewha, *History of Prisoner of War Utilization by the United States Army 1776-1945* (Washington, 1955); Gregory, P.R. & Lazarev, V. (eds.), *The Economic of Forced Labour – The Soviet Gulag* (Stanford, 2003)

⁴ Mark Spörer, *Zwangarbeit unter dem Hakenkreuz* (München, 2001); Herbert, *Hitler's foreign workers - enforced foreign labour in Germany under the Third Reich*, (Cambridge, 1997); Pfahlmann, *Fremdarbeiter und Kriegsgefangene in der deutschen Kriegswirtschaft, 1939-1945* (Darmstadt, 1968); Homze, *Foreign labour in Nazi Germany* (Princeton, 1967).

exploited through maximising employment, minimising payments, discrimination and abuse. This study complements Herbert and Spörer's works on POW employment. It provides more consistent employment data from a wide array of primary and secondary sources. Data from the German Ministry of Labour used by other authors is re-analysed for a first quantification of the POW's economic contribution to Nazi Germany's war economy. Liberman's approach of quantifying Germany's extraction of POW and foreign labour through deportation is also discussed and extended. Foreign civilian and POW labour are thoroughly intertwined as German statistics rarely separate them and as many POWs assumed civilian status during the war. The exploitation of foreign civilian labour therefore also features in this study, but the main focus lies on POW employment.

This study is structured as follows: Section One introduces the reader to the maintenance and employment of POWs in German hands during the Second World War and produces new POW productivity results. Section Two conducts a first quantification of the contribution of POW labour to the German war economy and sheds light on foreign labour contributions. Sections Three and Four analyse the dislocation of POW and civilian foreign labour of occupied territories and the economic effects of their mistreatment. Section Five concludes that the quantification of POW employment in this study reveals a greater degree of exploitation and economic contribution to the Nazi war apparatus than previously assumed.

1. POW labour in German hands

This section examines the exploitation of POW labour in German hands in terms of employment scale and conditions. New results on POW productivity and output are furnished and the economic gains of POW labour for Nazi Germany are quantified in monetary terms. POWs are combatants captured and held in custody by the enemy. Fourteen and a half million forced labourers passed through the German Reich from 1939 to 1945, a third of whom (4.6 million) possessed POW status at some point.⁵ Approximately 9.5 million foreign workers were transferred from occupied territories

⁵ Spörer, *Zwangsarbeit*, 223

to work in Germany during the war.⁶ These were voluntary and coerced workers from Western Europe, forced labour from Eastern Europe and concentration camp inmates. POW and foreign labour thus was clearly economically significant.

Foreign and POW workers nominally peaked at 7.5 million or 20 per cent of the civilian German labour force in September 1944;⁷ 1.93 million POW workers in August 1944 represented 5.3 per cent of the civilian labour force.⁸ Industry-specific shares were even higher. Foreign and POW labour represented a third of industrial and a fifth of rural labour in 1944;⁹ every fifth worker in the German coal mining industry was a POW in 1943¹⁰; every third worker in the German munitions industry in November 1944 was a foreign worker or POW.¹¹ Allied usages of German POW labour were extensive, especially post-war, but mostly smaller in comparison. At peak in November 1945, 550,000 out of 800,000 German POWs in France were working.¹² The Soviet Union held 2 million German POWs of whom many were employed, mostly under arduous conditions.¹³ 381,000 German POWs were employed at peak in summer 1946 in Britain, representing approximately two per cent of the British civilian labour force and one tenth of the British rural workforce. Approximately 315,000 German POWs were working in the US at peak in 1945.¹⁴ POW employment in German hands thus was more significant in scale and scope than that undertaken individually by most Allied captors.

The distribution and usage of the POW labour force at the disposal of the Germans shifted and intensified over time. After the successful experiment of employing 300,000 Polish POWs in agriculture during winter 1939 and spring 1940, British and French POWs were increasingly drawn upon and from 1942 onwards also Soviet POWs. The latter two groups presented the bulk of the POW labour force throughout the war, totalling at peak approximately two million. The Italian armistice in

⁶ Herbert, ‘Einleitung des Herausgebers’, in Herbert (ed.), *Europa und der Reichseinsatz, ausländische Zivilarbeiter, Kriegsgefangene und KZ-Häftlinge in Deutschland 1938-45*, (1997), 7

⁷ Pfahlmann, *Fremdarbeiter*, 228, table ‘Kräftebilanz’, cites total civilian labour force as 35.9 million.

⁸ Herbert, *Hitler's foreign workers*, 298

⁹ W. Abelshauser, ‘Germany: guns, butter and economic miracles’, in Harrison (ed.), *The economics of World War II- Six great powers in international comparison* (Cambridge, 2000), 158

¹⁰ Gerald Davis, ‘Prisoners of War in Twentieth-Century War Economies’, *Journal of Contemporary History*, Vol. 12, No.4, 629

¹¹ Pfahlmann, *Fremdarbeiter*, 232

¹² BA-MA (Bundesarchiv-Militärarchiv Freiburg), B 205/1276, Buisson, *Histoire du Service des Prisonniers de Guerre de l'Axe, 1943-1948*, 160 a)

¹³ Overmans, *Soldaten*, 322

¹⁴ H. Jung, *Zur Geschichte der deutschen Kriegsgefangenen des 2.Weltkrieges, Band X/I: Die deutschen Kriegsgefangenen in amerikanischer Hand – USA*, München, 1972, 204 states a peak holding of 346,000 German POWs in April 1945, of whom 91 per cent or 314,000 were employed.

September 1943 produced an additional labour source of half a million Italian POWs. They were re-classified as Italian Military Internees (IMIs) to circumvent the Geneva Convention. Polish, Soviet, Italian and French POWs were gradually released into civilian status to maximise potential labour exploitation. Initially, most POWs worked in agriculture, but by 1944, they were increasingly employed in coal mining and munitions industries. POW employment nominally peaked at around 2.2 million in January 1945. During the final six months preceding German surrender in May 1945, violations and atrocities against POWs sharply increased.

POW classification upon occupation varied widely. France, Belgium, Netherlands and Norway negotiated deals with Germany to free their soldiers from POW status and release them as civilians; one million French POWs were released to France in 1940.¹⁵ Flemish Belgian POWs were discharged in 1940 while Wallonians remained POWs in accordance with Nazi ideology.¹⁶ Norwegian and Dutch POWs were immediately discharged. German authorities attempted to re-classify 300,000 former Dutch troops as POWs for security and employment reasons in 1943, but following bitter protests and strikes only 10,000 re-arrested POWs were set to work in the Reich.¹⁷ Similarly, Greek POWs were initially freed, but 1,000 re-classified as POWs in 1943 and deported to Germany for work.¹⁸ Hungarian, Macedonian and Croatian POWs were immediately released from captivity. Yugoslavian POWs of Slovenian origins were released in 1942 and to be treated like German civilians.¹⁹ Conversely, captured Serbs remained POWs. They were treated worse because Hitler wanted to avenge Serbia's role in a successful coup d'état in March 1940 against the Yugoslav government.²⁰ Most Yugoslav POWs in German hands were Serbs, but still classified by German authorities as 'Yugoslavs'. Polish, Italian and Soviet POWs were not freed but increasingly re-classified as foreign civilian workers as labour shortages became more acute. This legal trick maximised employment and productivity because treatment was no longer legally bound by the Geneva Convention.

¹⁵ Herbert, *foreign workers*, 96

¹⁶ Pfahlmann, *Fremdarbeiter*, 86-88

¹⁷ Dear and Foot, *Companion*, 612 and H.Umbreit, 'Die deutsche Herrschaft in den besetzten Gebieten', in B.Kroener, R.Müller, H.Umbreit (eds.), *Das Deutsche Reich und der Zweite Weltkrieg*, Vol. 5/2. (Stuttgart, 1999), 212

¹⁸ Spörer, *Zwangarbeit*, 70

¹⁹ Ibid, 105

²⁰ Dear and Foot, *Companion*, 1012

Four main POW groups can be distinguished based on Germany's adherence to the Convention. British and American POWs received treatment mostly complying with the Geneva Convention. French and Belgians could suffer from arduous conditions but on average were treated fairly well. Yugoslavs and IMIs only encountered partial compliance. Poles and Soviets possessed no legal protection whatsoever.²¹ The differences in treatment largely arose given racial hierarchies advocated by Nazi ideology. The only exception were British and American POWs who received better treatment because of ever increasing holdings of German POWs by both countries. Western Europeans were regarded more or less as 'Aryans' while most Eastern Europeans and Soviets represented an inferior race. Soviet POWs were at the bottom end of this racial hierarchy. They were considered a liability until 1942 and died in masses. The changeover to a long-term war and increasing labour demand especially in coal mining resulted in a complete policy change towards large-scale Soviet POW employment. Two million Soviet POWs had already died of starvation or diseases by February 1942;²² Camp epidemics significantly hampered employment.²³ Ten per cent of all Soviet POWs in the industrial Bochum district had tuberculosis in 1944.²⁴ Despite their large scale employment and their widely acknowledged importance for the German war economy, Soviet POWs worked under extremely harsh conditions, lacked proper sanitation and received insufficient rations.²⁵ 3.3 million Soviet POWs or 57 per cent of all Soviet POWs in German captivity died.²⁶ The average life expectancy of a Soviet POW worker was a mere 12 months.²⁷ They constituted a very significant share of the POW workforce, peaking in January 1945 at 972,388 (45 per cent). This figure still understates Soviet POW employment as many were counted as civilians by that date.²⁸

²¹ Spörer, *Zwangarbeit*, 99

²² Ibid, 72

²³ Reinhardt, *Moscow – The Turning Point. The failure of Hitler's Strategy in the Winter of 1941-1942* (Oxford 1992), 263

²⁴ D.Eichholz, 'Die Krautaktion', Ruhrindustrie, Ernährungswissenschaften und Zwangarbeit 1944, in Herbert (ed.), *Europa*, 279

²⁵ Spörer, *Zwangarbeit*, 182

²⁶ Ibid, 104

²⁷ Ibid, 228

²⁸ Umbreit, 'Gebiete', 212. Streit, *Keine Kameraden – Die Wehrmacht und die sowjetischen Kriegsgefangenen*, 1941-45 (Stuttgart 1978), 212-213 provides a lower peak of 631,559 for August 1944.

Table 1. POW and foreign worker employment and output shares, 1943/1944

Industry	POW and foreign worker aggregate labour force share in 1944	Output share adjusted for relative productivity
Munitions	30.0 %	24.0 %
Air craft production	31.0 %	24.8 %
Chemical industry	25.7 %	21.0 %
Agriculture	41.0 %	32.8 %
Coal mining (1943)	37.5 %	30.0 %

Source: Pfahlmann, *Fremdarbeiter*, 233-234

Nazi Germany derived a significant economic benefit from POW employment. Table 1 shows that peak POW and foreign worker labour force shares in key industries in 1944 ranged from a quarter to forty per cent. Pfahlmann infers POW and foreign worker output from this assuming an average productivity of 80 per cent compared to German civilians.²⁹ He suggests that at peak a quarter of all key German industrial output was produced by foreigners and POWs, underscoring their important role for Germany's war production. Forced labour was 'indeed profitable for many firms' for Spörer.³⁰ German agriculture would have collapsed at the beginning of the war without the aid of the forced labourers, especially Poles. Mining could not have been sustained without foreign workers. Continuing the war from 1942 onwards was 'unthinkable' without their manpower.³¹ POW employment supported the military supply chain and released German civilians to industrial employment or the front line. Pfahlmann considers POW and foreign labour as 'decisive for the pursuing of the war'.³² Müller argues that the continuation of the war until spring 1945 was made possible through the coerced employment of the millions of Soviet civilians and POWs.³³ The exploitation and extraction of POW and civilian labour produced a resource vital for Germany's war machinery to the detriment of occupied territories.

POW labour allocation depended on timing, ideological allegiances and labour demand. Initially in 1940, more than half of all Western POWs were allocated to

²⁹ Ibid, 233-234

³⁰ Spörer, *Zwangarbeit*, 190

³¹ Ibid, 183

³² Ibid, 235

³³ Müller, 'die Rekrutierung sowjetischer Zwangsarbeiter für die deutsche Kriegswirtschaft', in Herbert (ed.), *Reichseinsatz*, 248

agriculture.³⁴ But demand for skilled industrial workers, particularly miners, triggered a shift to industry. The industrial share of POW and foreign civilian workers doubled from 14 to 28 per cent between 1942 and 1944 while their agricultural share remained at 50 per cent during the same period.³⁵ Their share in Austrian munitions industries rose from 10 to 35 per cent from 1942 to 1944.³⁶

Ideological discrimination largely determined work allocation. French and Belgian POWs employed in agriculture lived on farms in converted stables and could work individually or in small groups while Soviet POWs and IMIs were housed in large camps under arduous conditions and worked in gangs of 20 to 40 men.³⁷ French and Belgians showing ‘good conduct’ could work without escorts and enjoy limited freedom of movement.³⁸ French POWs were also deployed in selected skilled jobs; two glazier and four roofer and carpenter French POW battalions repaired bombing damage in major German cities. Output was very satisfactory, but demand for these selected skilled workers outstripped supply, preventing further battalions.³⁹

Half of all French POWs in February 1944 were employed in agriculture with superior employment conditions to industry, while only 37.5 per cent worked in manufacturing, construction, mining and transportation sectors.⁴⁰ Conversely, three quarters of the Soviet POWs and 92 per cent of IMIs were employed in the latter sectors.⁴¹ Soviets, Italians and Poles accounted for over 80 per cent of all foreigners employed in mining and consequently endured much more arduous employment and living conditions.⁴² The Italians suffered harsh treatment and high mortality rates because they were regarded as traitors after the fall of Mussolini 1943. Also, competition between government authorities for their labour entailed rushed employment without adequate accommodation and amenities in industries with arduous conditions. Almost half of all IMIs worked in the munitions industry in

³⁴ Herbert, *foreign workers*, 96-97

³⁵ Ibid, 248, table 24

³⁶ Speckner, *Kriegsgefangenenlager in der “Ostmark”*, 178

³⁷ Joachim Woock, *Zwangarbeit ausländischer Arbeitskräfte im Regionalbereich Verden/Aller (1939-45)*, 2004, 50

³⁸ Florian Speer, *Ausländer im "Arbeitseinsatz" in Wuppertal. Zivile Arbeitskräfte, Zwangsarbeiter und Kriegsgefangene im Zweiten Weltkrieg* (Wuppertal ,2003), 101

³⁹ Pfahlmann, *Fremdarbeiter*, 117-119

⁴⁰ Yves Durand, ‘Vichy und der Reichseinsatz’, in Herbert (ed.), *Europa*, 191

⁴¹ Spörer, *Zwangarbeit*, 225

⁴² Herbert, *foreign workers*, 296

August 1944 with particularly poor conditions.⁴³ Cajani argues that IMI hostility would have decreased and productivity increased had captivity conditions been better and administration more efficient.⁴⁴ Brutal and ideologically driven treatment and administrative confusion thus reduced POW productivity.

The frequent employment of British and American POW in mining, though in smaller numbers, illustrates that employment distribution was not only driven by ideology but also by labour demand. In August 1944, a fifth of all British POW workers were used in coal mining.⁴⁵ Davis explains the high POW employment rates in German coal mining with persistent and rising fuel demand.⁴⁶ Herbert argues that the reluctance of voluntary civilian workers from occupied territories to renew employment contracts and the nature of the mining sector as an arduous workplace and as a work environment in complete isolation from German workers also played a major role in the high proportion of forced foreign and POW workers in this industry.⁴⁷ POW employment in the Ruhr mining district increased from 43,800 or 11 per cent of the aggregate mining workforce in December 1942 to 81,700 (20 per cent) in February 1944.⁴⁸ Although a high proportion of British POWs worked in mining, Soviet POWs and IMIs were used more frequently. British POW employment in mining tripled 1942-44 in absolute terms from 4,500 to 15,000 but in relative terms, their POW mining worker share decreased from 12 to 6 per cent, while the Soviet POW share increased from 21 to 68 per cent and IMIs constituted a fifth. The French POW share fell from 60 to 6 per cent over the same period.⁴⁹ POW employment in mining was thus motivated by both ideology and labour demand.

⁴³ IMI share was 46 per cent. G. Habermann, ‘Vom Verbündeten zum Verräter, die italienischen Militärinternierten, 1943-45’, in Overmans and Bischof (eds), *op.cit.*, table 1, 584

⁴⁴ Luigi Cajani, ‘Die talienischen Militär-Internierten im nationalsozialistischen Deutschland’, in Herbert (ed.), *Europa*, 309

⁴⁵ 15,000 British POWs worked in coal mining in August 1944. Herbert, *Fremdarbeiter. Politik und Praxis des „Ausländer-Einsatzes“ in der Kriegswirtschaft des Dritten Reiches* (Bonn, 1999), 258. Total employed was 80,725 at that point. Eichholtz, ‘Zwangarbeit in der deutschen Kriegswirtschaft’, in Winkler (ed.), *Stiften Gehen, NS-Zwangarbeit und Entschädigungsdebatte* (Cologne, 2000), 17, table 1

⁴⁶ Davis, ‘Prisoners of War’, 629

⁴⁷ Herbert, *Fremdarbeiter*, 256-258

⁴⁸ Herbert, *Foreign workers*, 240, table 23

⁴⁹ Herbert, *Fremdarbeiter*, 258, table 35. This table is missing in Herbert’s English translation.

Table 2. POW productivity by nationality compared to German civilians

POW nationality	Productivity compared to German civilians (%)
Average	75- 80 %
French (Durand)	79 (unskilled) - 95 (skilled) %
French (Spörer)	80-90 %
Belgians	75-85 %
Poles	60-80 %
Serbs	60-70 %
British	45-55 %
IMIs	30-60 %
Soviet (Durand)	39 (unskilled) - 44 (skilled) %
Soviet (Spörer)	40-50 %
Soviet (Streit)	50-60 %

Sources: Average: Pfahlmann, *Fremdarbeiter*, 229

French: Durand, 'Vichy', 192-193; Spörer, *Zwangsarbeit*, 186

Soviets: Durand, ibid; Streit, *Kameraden*, 215; Spörer, ibid

Belgians, Serbs and British: Spörer, ibid

Poles: Herbert, *Fremdarbeiter*, 110

IMIs: Cajani, 'Militärinternierte', 298

Table 3. Average POW productivity adjusted by POW workforce share

Date	Share-adjusted POW average productivity
February 1942 ^a	72.3 %
September 1942 ^a	66.2 %
February-September 1942 ^a	69.7 %
August 1943 ^b	63.6 %
November 1943 ^b	58.3 %
August 1944 ^c	56.5 %
January 1945 ^b	55.2 %

Sources: POW workforce: ^a Pfahlmann, *Fremdarbeiter*, 136-37; ^b Umbreit, 'Gebiete', 212; ^c D.Eichholtz, 'Zwangarbeit in der deutschen Kriegswirtschaft', 17, table 1

POW productivity data is limited to several case studies undertaken by German authorities. Table 2 reveals a wide productivity range and a clear hierarchy. Herbert and Spörer claim Belgian and French POWs were most productive and preferred by employers to other POWs. Skilled agricultural Belgian and French POWs sometimes worked unsupervised. But these estimates could be upwardly biased by racial considerations. Conversely, Soviet POWs and IMIs were least productive, less than

half as productive as civilians, because of ideological considerations entailing brutal treatment, diseases and starvation. However, Soviet POW productivities are also contested. Several authors find French POWs twice as productive as Soviets, attaining approximately 80 per cent of civilians compared to 40 per cent.⁵⁰ Streit argues that Soviet POW productivity was much higher. He finds that it pivoted around 50 to 60 per cent in 1942/3 and peaked at 70-80 in mining. Employers allegedly biased Soviet POW productivity downwards to minimise wages.⁵¹ The comparatively low British POW productivity probably stemmed from Germany's limited adherence to the Geneva Convention constraining labour supply and employment types.⁵²

POW productivity ranged from 30 to 100 per cent according to nationality and industry. Potential upward bias could stem from racial preferences for Western POWs and the government's desire to present favourable production results. Most authors use the same case studies, so it is difficult to test data reliability. Spörer's figures are all drawn from a POW wages study in the construction sector from 1942 and Tooze relies on Herbert's 1942 case study of the Krupp Steel works in Essen (GSF). Pfahlmann's overall average of 75 to 80 per cent appears excessive in light of these issues. POW productivity ranged widely and did not remain constant. French POW productivity fell after 1941 because guarding was reduced and because French POWs realised that they earned considerably less than their French civilian co-workers.⁵³ Peak and average productivity of large groups such as IMIs and Soviets also significantly undercut Pfahlmann's average. Finally, regional evidence suggests a lower productivity range. POWs (mostly French and Soviet) in Rhineland and Westphalia in 1943 attained 50 per cent of civilian productivity in mining and 70 per cent in metal industries while Polish, French and Belgian civilian workers achieved 80-100.⁵⁴

A more precise average POW productivity can be inferred from available employment statistics. Each group's average productivity is weighted by that group's share in the aggregate POW workforce. Minimum productivity figures are used for

⁵⁰ Herbert, *foreign workers*, 224, table 21 quotes a case study in Essen. French POWs achieved 84.7 per cent of civilians, Soviets 41.7. Durand, 'Vichy', 192-193 places unskilled Soviets at 39 and skilled at 44 per cent in a different study.

⁵¹ Streit, *Kameraden*, 215 and fn 151-153

⁵² Germany selectively adhered to the Convention regarding British POWs, so they were not employed in munitions industries unlike other POW groups. Spörer, *Zwangsarbeit*, 88

⁵³ Pfahlmann, *Fremdarbeiter*, 149-150

⁵⁴ Herbert, *Fremdarbeiter*, 323, table 46

French and Soviet POWs to account for falling productivity over time and against bias; median figures are used for all other groups. Table 3 shows that the average POW productivity fell from 72 per cent in February 1942 to 55 per cent in 1945. As productivity is assumed to be constant, the decrease is driven by the rise in the share of less productive Soviet POWs and simultaneous fall in French POW workers. Tooze finds foreigner and POW worker productivity in the Krupp works increased during 1942 and thus assumes that as the aggregate foreign labour pool expanded, its average productivity also rose.⁵⁵ Intuitively, productivity should increase over time given a rising learning curve, but frequent reassessments, starvation, mistreatment and bombings reduced productivity. The results suggest the latter effects dominated as productivity fell, but they assume a constant productivity by POW group. Still, the attained average productivity range of 50 to 70 per cent can be taken as a realistic minimum. It confirms the qualitative results above and is in line with POW productivity in Allied hands.

POWs were not only exploited economically but also financially. Employers preferred POWs to foreign workers as they were cheaper and as guarding and lodging were the Wehrmacht's responsibility.⁵⁶ The experiment of Polish POW employment in 1939 was highly successful because POWs were cheap and mobile workers that could be controlled via guarding.⁵⁷ Case studies reveal that POW productivity often exceeded wages. POWs in the coal mine 'Berghütte' in Upper Silesia were on average 75-80 per cent as productive as civilians, but employers only paid at most 60 per cent of civilian wages, so productivity exceeded wages by up to a third.⁵⁸ Krupp paid on average 67.5 per cent of German civilian wages for French POWs while they were 80-90 per cent as productive.⁵⁹ Allowing for taxes and fees, employers paid on average two thirds of civilian wages for POWs to camp authorities. The prisoners themselves only received a minuscule fraction of this because of food, clothing, accommodation and tax deductions. Compared to the average German industrial weekly wage in 1943 of 51 Reichsmark (RM), non-soviet POWs received 16 RM (31 per cent) and soviet POWs 8 RM (16 per cent). Taxes and wages also reflected racial discrimination. The Western POW minimum wage in 1941 was 0.70 RM/day

⁵⁵ Adam Tooze, *The Wages of Destruction, The Making and Breaking of the Nazi economy*, (London, 2006), 537-538

⁵⁶ Herbert, *Fremdarbeiter*, 90

⁵⁷ Herbert, *Fremdarbeiter*, 78

⁵⁸ Sulik, 'Volkstumspolitik', 119

⁵⁹ Herbert, *Fremdarbeiter*, 240, table 27, 241

compared to 0.50 RM for Poles and 0.20 RM for Soviets. Poles were also more heavily taxed and received fewer benefits than Western workers.⁶⁰ Financial exploitation from the prisoners' perspective was thus highly significant. Comparing POW productivity from table 2 with average wages paid by employers as a share of average civilian wages (66 per cent), we find that firms profited from employing French, Belgian and Polish POWs as their productivity exceeded wages. Conversely, firms incurred losses with Soviet, British and IMIs, whose wages exceeded productivity, implying that employers preferred the former to the latter POW group.

Evidence from the Essen Krupp Steel works (GSF) confirms this impression. French POW productivity exceeded average wages by 20 per cent while Soviet POW productivity was 40 per cent lower than wages.⁶¹ Also, a cost-benefit analysis was conducted in November 1942 at the same works. French POWs were 85 per cent as productive as German civilians and cost 85 per cent of their wages at 7.17 RM daily instead of 8.42 RM, so their net costs were virtually the same. Conversely, at the same wage cost Soviet POWs were only 42 per cent as productive owing to poor food supply and physical condition, so a Soviet POW cost twice as much per day as a German civilian. Nevertheless, POWs were not necessarily more expensive than foreign civilian workers. Italian, French, and Dutch workers in this case study were all less productive than French POWs at around 70 per cent with higher daily wage costs of 10.62 RM. Dutch workers at GSF were twice as expensive as Germans because they were paid food and housing expenses in addition to wages while only being 62 per cent as productive as German civilians. Female Eastern civilian workers performed best as they were almost as productive as French POWs (81 per cent of German civilian productivity) and cost less than the French, but their net cost was still 13 per cent higher than a German civilian.⁶² In this case French POWs were more productive than most civilian workers while Soviet POWs and Dutch civilians fared worst.

But profitability depended on work type and circumstances. On piece-rate work for instance, Soviet POWs were potentially profitable, attaining German civilian productivity but only costing 88 per cent of their wages.⁶³ Bearing in mind that costs not incurred by employers such as health insurance, camp construction, transportation

⁶⁰ Spörer, *Zwangarbeit*, 164-5, 185

⁶¹ Herbert, *Fremdarbeiter*, 240, table 27, 241

⁶² Herbert, *foreign workers*, 299, 300, table 30

⁶³ Streit, *Kameraden*, 215

and guarding was paid for by the Wehrmacht, an overall profit from POW labour for the German economy remains ambiguous. Spörer's comment that POW labour was 'rarely' profitable implies a net loss, but the above evidence reveals heterogeneous POW productivity, so some POW groups may have been more profitable than others. POW labour exploitation from occupied territories crucially depended on racial discrimination and labour demand. While the former worsened employment conditions considerably, the latter sometimes mitigated these atrocities given the need to maintain an able labour force. Eastern Europeans and Soviets suffered by far the most in this POW pecking order. They were treated worse, paid and fed less and subjected to arbitrary abuse.

2. The economic contribution of POW labour

The economic exploitation of labour from occupied territories will be quantified in three ways. First, the Reich's benefit derived from POW labour and from foreign labour will be quantified using the productivity estimates attained above. Second, evidence on labour dislocation from several occupied territories will shed light on the enormous scale of labour transfers and their negative effect on the occupied countries. Third, the economic effect of POW and foreign labour treatment will be discussed. Table 4 illustrates that the share of foreign and POW labour of the aggregate German labour force during the war increased twentyfold 1939-44 and doubled 1942-44. Comparable aggregate civilian and POW data only exist until autumn 1944. Statistics are drawn from the German Ministry of Labour (*Reichsarbeitsministerium*, hereafter RA) which might exaggerate employment figures to euphemize results. POWs initially made up most of the foreign workforce but represented only a quarter of the foreign labour pool in 1944. Every tenth worker in Nazi Germany was a foreigner on average 1939-44. Adjusting for annual average POW productivity for all employed POWs using the results above, net contribution to the aggregate labour force sharply increased from 0.5 in 1939 to 3 per cent at peak in 1944. After reaching 3 per cent in 1942, it falls slightly in 1943 as the fall in productivity exceeds the increase in POW employment share, but recovers in 1944.

Table 4. POW and foreign labour share of the aggregate German civilian labour force, 1939-44

Year	(1) POW and foreign labour share (%)	(2) POW share (%)	(3) Productivity adjusted POW share (%)
1939	0.76	0.76	0.55
1940	3.33	3.33	2.41
1941	8.31	3.88	2.80
1942	11.83	4.12	2.87
1943	17.21	4.43	2.58
1944 (Sept.)	20.90	5.38	3.04
Average 1939-44	10.40	3.65	2.38

Sources: (1): Pfahlmann, *Fremdarbeiter*, 137, 228. (2): Herbert, *Fremdarbeiter*, 111, 137, 209, 314

Notes: (1) May figures 1941-43; (2) from varying months. Average productivity used for (3): 1939-41: 72.30%; 1942: 69.72%; 1943: 58.3%; 1944: 56.50%. See table 3 above for calculations. No aggregate civilian figure available for 1945.

Employment numbers are converted into ‘man-days’ to provide an output yardstick in absolute terms. This measure was used by the US, Canada and Australia for POWs in their hands. One man-day denotes an eight-hour work day performed by one POW. Direct comparison to German POW employment is problematic. While German POWs in Britain, the US and Canada mostly worked these eight-hour days six days a week, POWs in German hands worked much longer hours, especially towards the end of the war and had fewer holidays. Working hours and employment conditions differed substantially between industries such as mining and agriculture and could vary considerably given bombings, underground sites and evacuation marches. British POWs employed in a lignite coal site worked 9 hours per day with only one in four Sundays off in 1941.⁶⁴ In 1942, British POWs on average worked eleven to seventeen hours daily in Germany.⁶⁵ German statistics furnished on a foreign steel worker in Essen reveal 8.6-9.1 daily hours worked 1940-44.⁶⁶ POWs in German hands probably worked more than eight hours on average per day, so the man-day measure yields a minimum estimate for the POW contribution. Four different test methods are used to obtain an output range. First, Pfahlmann’s figures

⁶⁴ H. Satow and M.J. Sée, *The work of the POW department in the Second World War* (London: Foreign Office 1950), 37

⁶⁵ The National Archives, Kew, (TNA): WO 32/10740, Gardner to Johnston-Burt, 11 August 1942

⁶⁶ Herbert, *foreign workers*, 226, table 22

underlying table 1 provide employment snapshots from May for each year. This yields 2.4 billion man-days assuming that POWs worked 25 days per month and 300 days annually. Taking 250 working days instead, used by firms such as Karcher,⁶⁷ produces approximately 2 billion man-days. These calculations however assume a constant POW workforce throughout the year. Given the war progress and the seasonal nature of agriculture, the main area of POW employment, this clearly was not the case.

Alternatively, the second test measures POW employment cumulatively. The majority of the 4.6 million POW workers passing through Nazi Germany's economy were French and Soviet. The average Soviet POW worker life expectancy was twelve months. French POWs experienced much lower mortality rates but were frequently released into civilian status to maximise employment. Assuming that French POWs worked on average four years while Soviets worked one and adjusting for their share in the POW labour force at peak in 1945 yields an average working period of 1.6 years or 19 months and a man-day total of 2.2 billion. However, this methodology again ignores seasonal fluctuation in employment and smaller POW sub-groups.

Thirdly, continuous monthly data yields the most precise estimate. Pfahlmann provides continuous employment data for several months in 1941 and 1942 for POW and civilian internee labour (table 5, (1)-(3)). From 1943 onwards the evidence becomes patchier. Monthly data from February, August and November 1943 from different sources is taken to yield an annual average (4). For 1944, the only available monthly data from August is used, assuming for simplicity constant employment during the year (5). The last available figure of 2.2 million dates from 1 January 1945. While POW employment was certainly high given the needs to sustain the total war effort in 1945, virtually no data is available after January. POW employment conditions deteriorated dramatically during the Reich's total economic and military collapse in winter 1944/45 and spring 1945. Herbert describes frequent bombings, evacuation marches, executions and abuses against foreign workers and POWs.⁶⁸ The sudden increase in British and American POW deaths in January 1945 confirms the drastic deterioration of captivity conditions and implies even higher death rates for POW groups less protected than British or Americans.⁶⁹ Given Allied advances onto

⁶⁷ Ibid, 251

⁶⁸ Herbert, *Fremdarbeiter*, 379-395

⁶⁹ Streit, *Kameraden*, 293

German territory by February and March and frequent POW evacuation, POW employment from February to May 1945 probably was much lower than in January 1945.

Table 5. POW employment and man-days, 1939-45

Period	Average POW employment	man-days worked during period (million)
(1) Oct. 1939 to Dec. 1939	213,115	16.0
(2) February 1940 – April 1941	851,513	319.3
(3) December 1941 – September 1942	1.46 million (incl. civilian internees)	364.4
(4) 1943 (annual; seasonally adjusted)	1.64 million	493.8
(5) 1944 (annual)	1.91 million	476.8
(6) 1944 (revised annual)	2.33 million (incl. transformed French and Poles)	583.7
(7) January 1945	2.19 million	54.7
Total A (1-5,7)		1,725.1
Total B (1-4,6,7)		1,832.0

Sources: POW employment numbers - (1): Herbert, *foreign workers*, 62; (2)&(3): Pfahlmann, *Fremdarbeiter*, 111, 137; (4): Herbert, *Fremdarbeiter*, 209 for February and B. Kroener, R. Müller, H.Umbreit (eds.), *Das deutsche Reich und der zweite Weltkrieg, Band 5/2*, 212 for August and November; (5) : D.Eichholtz, *op.cit.*,17, table 1; Herbert, *op.cit.*, 298; (6) : own calculations, see text; (7): Umbreit,*ibid.*

Table 5, based on the third test, illustrates that POW employment rapidly increased from 1940 onwards and peaked at 2.2 million. The total man-day usage for the given periods in table 5 is lower than in the previous two tests at 1.73 billion. This result has to be interpreted carefully. Data for 11 months is missing until January 1943 and extrapolations from 1943 onwards underlie different seasonal demands as August is the peak harvest month, so averages may be overstated. Also, complete

POW employment data only exists for half of the war's total duration.⁷⁰ We cannot merely double the result to produce a better estimate because employment increases were not linear but varied considerably over time depending on military successes and seasonal demand. But continuous monthly data from February 1940 to April 1941 and December 1941 to September 1942 is somewhat representative for the entire period as it denotes medium POW usage levels compared to the peak in January 1945. Total man-days worked would be 2 billion if sensitivity analysis, the fourth test, is applied, taking the 60 months from February 1940 to April 1945 and using the averages from periods (2) and (3) for 1940-41 and 1942-45 respectively.

The third's and fourth's test range of 1.725 to 2 billion man-days appears more accurate than tests one and two, but data problems remain. Herbert argues official Soviet civilian and POW employment figures are understated. Also, his statistics from August 1944 do not add up. He gives a grand total of 1.93 million POW workers, but his individual POW figures only add up to 1.73 million, so 200,000 workers are missing. Eichholtz's more complete version of the same RA dataset reveals Herbert omitted 89,359 Yugoslav and 80,725 British POW workers.⁷¹ Their inclusion reduces missing POW workers to 22,500 and brings the total to 1.91 million POW workers. However, Eichholtz also gives a grand total of 1.93 million although his numbers only add up to 1.91 million. In addition, Herbert uses slightly lower annual employment figures in yet another publication.⁷² To minimise errors, the lower confirmed estimate of 1.91 million is used for the third test. The employment data for 1945 is even more incomplete. British POW employment in January 1945 was 25 per cent higher than in August 1944,⁷³ demonstrating that POW employment intensified in 1945, so aggregate man-day usage was higher than the above results. This intensification was quickly followed by Germany's complete economic disintegration, so the understatement bias created through missing POW employment figures from February to May 1945 may not be severe.

Belgian, Polish, French and Italian POWs were 'transformed' to civilian status from 1943 onwards, so they were not included in the official POW workforce. Spörer suggests that 850,000 of 885,000 overall transformed POWs survived until May

⁷⁰ All available complete monthly statistics only provide data for 33 of 65 months from October 1939 to April 1945.

⁷¹ D.Eichholtz, *op.cit.*, 17, table 1

⁷² Dear and Foot (eds), *op.cit.*, 299. Herbert does not explain where his figures come from.

⁷³ 101,564 British POW were employed in January 1945. Umbreit, 'Gebiete', 212

1945.⁷⁴ This cannot simply be added back to POW employment since different POW groups were transformed at different points in time. 205,000 Poles changed status in 1940 and 220,000 French in 1943/4.⁷⁵ All IMIs were forced into civilian status from September 1944 onwards.⁷⁶ Adding the French and Poles to the August 1944 dataset brings total POW employment to 2,335,000 (see row (6) in table 5) and increases annual man-day output by 107 million or 6 per cent to 1.832 billion. Spörer does not specify the remainder of his transformation estimate, but adding the 460,000 IMIs to the transformed French and Poles yields precisely his gross estimate. Spörer's figures suggest a 4 per cent mortality rate for transformed POWs. Applying this to the French and Poles reduces the 1944 total workforce to 2,318,000 and by 4 million man-days for B. Assuming that by August 1944 all surviving transformed POWs worked as civilians, 2.76 million 'real' POWs would have worked 690 million man-days in 1944, increasing the man-day aggregate by 12 per cent to 1.94 billion. The same assumption produces a staggering 'real' POW labour force in January 1945 of 3 million, but this would only increase man-day totals by one per cent.

Table 6. Test results for POW man-days

Test type	Result/range (billion)	RA data sources
I.) Sampling	1.978 – 2.374	Pfahlmann
II.) Accumulation	2.185	Pfahlmann, Spörer
III.) Periodisation all transformations)	1.725 – 1.83 (1.94 incl.	Pfahlmann, Eichholtz, Umbreit, Herbert
IV.) Sensitivity Analysis	2.0	Pfahlmann

The tests have produced man-day estimates ranging from 1.73 to 2.37 billion (table 6). The most robust methodology using continuous employment data yields a range of 1.73 to 1.82 billion. The upper bounds of all tests touch 2 billion. In light of the statistical understatement discussed and the need to include transformed POWs, the maximum of 1.8-1.9 billion from test III.) appears most realistic. This gain

⁷⁴ This figure is arrived at by subtracting Spörer's non-transformed POW survivors from all POW survivors 1945. Spörer and Fleischhacker, 'Forced Laborers in Nazi Germany: Categories, Numbers and Survivors', *Journal of Interdisciplinary History*, XXXIII:2 (autumn 2002), 196, table 8

⁷⁵ Poles: Spörer and Fleischhacker, 'Forced Laborers', 189, table 5; French: Spörer and Fleischhacker, 'compensation', 17

⁷⁶ Cajani, 'Militärinternierten', 305

simultaneously produced human capital losses for the POWs. Each POW lost 1.6 years of gainful employment or education while his labour contributed to the German war economy.⁷⁷

The above results enable a first estimate of the monetary contribution of POW labour to the German economy. The POW man-days can be multiplied by their monetary value, i.e. the productivity adjusted wages that POWs should have been paid and compared to German GNP. However, all four variables required for these calculation, GNP values, civilian wages, relative POW productivity and manday values, are difficult to ascertain and there are compatibility issues. Estimates for German GNP and GDP during the war are incomplete and contested. No GNP or GDP data exist for 1945; Maddison solves this problem by interpolation from 1944 and 1946 estimates.⁷⁸ But he does not provide any evidence for his assumption that GDP should have increased from 1944 to 1945 despite extensive war damages. Also, he employs GDP estimates from the United States Strategic Bombing Survey (USSBS) that are deemed excessive by other authors. This study uses slightly lower and more recent figures by Ritschl and Spörer.⁷⁹ These figures then have to be compared to the hypothetical POW output. The year 1943 offers the most complete dataset for these purposes. The 1943 man-day result from test III.) is adjusted for the lower bound average 1943 POW productivity of 58 per cent and then multiplied by the average German civilian industrial daily wage 1943 to attain the POWs' monetary contribution to aggregate output. This yields 2.44 billion RM or 1.5 per cent of Germany's 1943 nominal GNP. Repeating the exercise with the upper bound average 1943 productivity of 63 per cent would increase contribution to 2.64 billion RM or 1.6 per cent of GNP.

The quantification above used the 1943 average industrial wage of 51 RM/week or 8.50 RM/day from Spörer because most POWs, especially the Soviets, worked in industry. The GSF case study above confirms this daily wage rate range, but further sources on wages are necessary to extend the calculations to the other war years. The *Statistisches Handbuch von Deutschland* contains the most reliable data on wartime civilian wages. However, the *Handbuch* only distinguishes between skilled and

⁷⁷ 1.832 billion man-days worked by 4.6 million POWs translate into 398.3 man-days done per POW or 1.6 work-years of 250 days each per POW. Interestingly, this corresponds to the result of test 1.).

⁷⁸ A.Maddison, *Monitoring the World Economy, 1820-1992* (OECD, Paris, 1995), 130

⁷⁹ A. Ritschl/M. Spörer, 'Das Bruttonsozialprodukt in Deutschland nach den amtlichen Volkseinkommens- und Sozialproduktstatistiken 1901-1995', *Jahrbuch für Wirtschaftsgeschichte* (1997) no. 2, 27-54

unskilled wages. Most POWs were employed in unskilled jobs in industry and agriculture, but a small proportion also worked on skilled jobs such as the French glazier battalions. Also, POWs in unskilled or semi-skilled jobs became skilled over time through training on the job. Herbert finds that the extent of the skills acquired varied because of for instance low productivity expectations barring Eastern workers from skilled jobs in the metal sector. At the same time, the severe labour shortages from 1943 onwards produced training schemes for Eastern workers and POWs in some firms.⁸⁰ Wages should therefore be weighted according to the proportion of POWs in unskilled and skilled jobs. As no aggregate data on the relative shares of skilled and unskilled POW workers are available, the contribution is calculated using both skilled and unskilled wages. This approach yields a contribution range with the unskilled wage result denoting the minimum and the skilled wage result showing the maximum. The POW man-day results had to be adjusted for compatibility with GNP figures because apart from 1943, there are monthly statistics but no consistent data on annual employment. Table 7 shows POW contributions in Reichsmark using these annualised man-day figures for both skilled and unskilled wage calculations. Table 8 relates them to German GNP.

Table 7. Monetary POW labour contribution, 1939-44

Year	Man-days worked (million)	POW productivity	Unskilled wage (1) RM/day	Skilled wage(2) RM/day	Contribution with (1) billion RM	Contribution with (2) billion RM
1939	15.98	72.32 %	5.79	8.05	0.06	0.09
1940	255.46	72.32 %	6.02	8.54	1.11	1.58
1941	255.46	72.32 %	6.54	9.24	1.21	1.71
1942	437.24	69.14 %	6.36	9.07	1.92	2.74
1943	493.75	60.94 %	6.51	9.19	1.96	2.76
1944	476.88	59.46 %	6.57	9.19	1.86	2.60

Note: Man-days 1940-42 adjusted to show total on annual basis. Wages: daily civilian averages in Reichsmark derived from weekly wages. POW productivity denotes average productivity relative to German civilians. 1943 productivity is an average figure or available data.

Sources: Man-days: Table 5. POW productivity: table 3. Civilian average wages: Länderrat des Amerikanischen Besatzungsgebiets (ed.), *Statistisches Handbuch von Deutschland, 1928-1944*, (München, 1949), 470-471

⁸⁰ Herbert, *foreign workers*, 301-303

Table 8. POW labour contribution range, 1939-44

Year	GNP contribution (%) using (1)	GNP contribution (%) using (2)
1939	0.06	0.08
1940	0.83	1.18
1941	0.83	1.17
1942	1.26	1.80
1943	1.19	1.69
1944	1.18	1.65
Average 1940-44	1.06	1.50
Average 1941-44	1.12	1.58
Average 1942-44	1.21	1.71

The contribution for 1939 is extraordinarily low because the POW status only commenced in September, so POWs worked for three months during 1939 while GNP is on an annual basis. Assuming that POWs would have worked the same amount on an annual basis for 1939, their contribution would rise to 0.2-0.3 per cent. Their minuscule contribution is not surprising because POW employment was lower than in later war years, but it illustrates that POWs were put to use almost immediately after the outbreak of hostilities. The calculations show that POW labour contributed at peak 1.3 to 1.8 per cent to the German economy p.a. for at least three consecutive years. On average POW employment yielded between 1.6 and 2.3 billion RM annually from 1940 to 1944 and contributed 1.0 to 1.5 per cent p.a. during this period. The contribution surprisingly peaks in 1942 while GNP figures are highest for 1943. This is mainly due to the relatively high average productivity and man-day estimate in 1942 as wages remained relatively stable over time. One would have expected the peak to occur in 1944 because POW employment continuously rose from 1943 onwards. Conversely, the results suggest that higher POW employment was reduced by lower average productivity in 1943 and 1944. This however relies on the assumption that the value attached to their labour, civilian wages in this case, did not change. If the scarcity of labour as a factor of production from 1943 onwards was factored into this value, then probably the POW contribution in 1943-44 would be higher.

Two alternative man-day measures are used to attain more precise and robust contribution results. First, Pfahlmann's snapshot figures from methodology I.) above also allow a calculation of man-day annual estimates. The upper bound Pfahlmann

man-day figures using 300 man-days p.a. have been deemed excessive, so the calculations are repeated using Pfahlmann's results based on 250 man-days p.a. Table 9 depicts results very similar to those obtained in table 9 in terms of average contribution, but the contribution peaks in 1944 with 1.2 to 1.7 per cent. The timing of the peak affirms the qualitative analysis above and makes these figures appear more robust compared to the annualised method.

Table 9. POW labour contribution using Pfahlmann, 1939-44

Year	GNP contribution (%) using (1)	GNP contribution (%) using (2)
1939	0.07	0.09
1940	0.97	1.38
1941	1.13	1.60
1942	1.06	1.51
1943	0.98	1.38
1944	1.19	1.67
Average 1940-44	1.07	1.51
Average 1941-44	1.09	1.54
Average 1942-44	1.08	1.52

Source: Same as in table 7 apart from man-days: Pfahlmann, *Fremdarbeiter*, 228

The second alternative method investigates the POW aggregate contribution over the entire period 1940-44. Instead of individual man-day estimates, we return to the most precise and robust man-day estimate from above, the newly attained man-day aggregates for 1939-44 including transformations. Depending on how many transformed POWs are included, this yields 1.832 or 1.94 billion man-days. The years 1939 and 1945 are excluded as it was established that the year 1939 is problematic and that no plausible GNP data is available for 1945. This yields 1.77 and 1.87 billion respectively for 1940-44. These figures then undergo the same monetary contribution procedure and are subsequently compared to the aggregate 1940-44 GNP of 754 billion RM. The higher and more realistic man-day result of 1.87 billion for 1940-44 yields a monetary contribution of 7.8 billion Reichsmark using the unskilled and 11.3 billion using the skilled wages. The contribution range is 1.05 to 1.5 per cent of 1940-44 GNP respectively. In other words, POW contributed at least one per cent to Germany's war economy over the course of the war years 1940-44. The three contribution tests, namely the annualised calculation, the Pfahlmann method and the

aggregate method all yield very similar contribution results despite using slightly different man-day estimates. The annualised method suggests the highest manday contribution from 1940-44 of 1.92 billion followed by 1.90 billion following Pfahlmann's methodology and 1.87 billion for the aggregation results. The established average contribution range, 1.0 to 1.5 per cent, is confirmed by all methods, but peak contribution differs.

Since the aggregation method uses the most robust but also lowest man-day figures, its contribution range can be regarded as the affirmed minimum. The Pfahlmann method suggests that the contribution peaked just below two per cent in 1944. The annualised method shows that the average contribution clearly increased between 1942 and 1944 to 1.2 to 1.7 per cent while the Pfahlmann data suggests a rather constant contribution over time. This sensitivity analysis therefore indicates that POW labour contributed between one and two per cent to German GNP 1940-44 and that contribution was highest 1942-44. Accounting for the higher contribution of skilled POWs using case study data only marginally increases contribution. 13 per cent of French and 8 per cent of Soviet POWs at GSF Essen in 1942 were skilled workers.⁸¹ Assuming for simplicity that this represents the average skill share of all POW workers and adjusting for the population shares of French and Soviet POWs yields a skill share of 10 per cent, but this would only raise results slightly. The minimum contribution in table 8 would be raised by 4 per cent and peak contribution in 1942 would be 1.32 instead of 1.26 per cent. Adjusting for skill shares appears not to alter results significantly, but the case study data may not be representative.

The results appear small at first glance because the monetary contribution is much lower than the prisoners' share of the labour force. POWs represented at peak 5 per cent of the German aggregate labour force in 1944 but only contributed at most 1.65 per cent to aggregate German output during that year. The productivity-adjusted share of POWs of the German aggregate workforce in 1944 is 3 per cent (table 4). All averages from the annualised method and Pfahlmann's data only represent a quarter or at most a third of the average gross labour contribution over the period 1940-44. The prisoners' net contribution therefore was substantially lower than their gross labour contribution. This is not entirely surprising because POWs mostly worked in unskilled jobs under arduous conditions. These results still imply that actual wartime

⁸¹ Herbert, *foreign workers*, 224

POW labour contribution was significant. The attained average aggregate contribution of one per cent constitutes a lower bound estimate given GNP and wage data constraints. The man-day figures are incomplete and only partly account for POW transformations. The actual man-day contribution would probably be higher than two billion. Constraints such as administrative inefficiencies, arduous employment conditions and the almost complete annihilation of the large Soviet POW workforce seem to have affected output less than thought in light of this minimum annual contribution. Finally, one has to bear in mind that a war economy could not afford to lose one per cent of its output, especially not in the face of total defeat. The opportunity cost of reallocating civilian labour from munitions industries to agriculture or other industries to alleviate manpower shortages was extremely high. Tapping POW and foreign labour instead allowed, in theory at least, for a constant military output without substantial losses in food and industrial output at the same time. Given the ever increasing labour scarcity, the attained ‘market’ value of the POW labour most probably understates its real value to the German war economy.

The methodology used to quantify the value of POW labour for the Reich can also be extended to forced foreign labour in Nazi Germany. A rough estimation of its aggregate value suffices because this study’s main focus lies on POW employment and because of the data constraints relating to POW employment statistics, the complications with transformations from POW to civilian status and the difficulty to compute year-specific combined POW and foreign labour productivities. Abelshauser’s figures for the aggregate German and foreign labour force are used for man-day calculations under the 250 man-day p.a. assumption.⁸² This yields a contribution of 5.5 billion man-days of foreign labour to the Reich’s economy from 1939-1944. The man-day contribution translates into a total monetary contribution of 35 billion RM from 1939 to 1944 using unskilled wages. Foreign and POW labour delivered 6 and 7.5 per cent of GNP at peak in 1943 and 1944 respectively and produced an average contribution of 4 per cent over the period 1939-44. The adjustment for lower foreign labour productivity compared to German civilians using Pfahlmanns’ lower bound average productivity of 75 per cent lowers contribution to 3 per cent on average and 6 per cent at peak in 1944. Pfahlmann’s figures have been deemed excessive above. But their upward bias should be more than compensated for

⁸² Abelshauser, *op.cit.*, 160-161

by a downward bias. As in the case of POW labour, the computed ‘market’ value of foreign labour is much lower than its real value in a labour-scarce war economy. On average every tenth worker was a foreigner during 1939-44, but net contribution to aggregate output was less than half of this. However, the above analysis has illustrated that their contribution to labour as a factor of production was substantial in quantitative and qualitative terms. Forced foreign labour constituted a vital resource for the Reich by increasingly replacing civilian labour as the war progressed.

Adherence to the Geneva Convention reduced the POW labour utility for the German Reich. Nazi Germany’s adherence to the Geneva Convention was highly selective, driven mostly by ideological and economic factors. The economic benefit of POW labour was highly significant. At peak, over 2 million POW workers, mostly French and Soviet, worked in the Reich under extremely divergent conditions. POW labour was less significant than foreign civilian employment, but at peak POWs represented more than 5 per cent of the German aggregate labour force. Their labour was exploited to the fullest extent despite administrative inefficiencies and presented a gain to the German war economy of at least 1 per cent of GNP from 1940-44 and almost 2 per cent at peak between 1942-44. The contribution of the 7 million foreign and POW workers overall was even greater. Every tenth worker in the Reich was foreign or a POW during 1939-44 and contributed at least 4 per cent to German GNP.

3. *The dislocation of POW and civilian labour in German hands*

Labour transfers played a key role to enable this large scale economic contribution of foreign and POW labour to Germany and in turn severely harmed the occupied countries’ economies. This section examines the interplay of POW and civilian foreign labour deportations, their effect on occupied territories and presents extensive data on Western European labour deportations. Herbert distinguishes three foreign labour recruitment phases for the Reich. During the first war phase until the end of 1940 and the second until the end of 1942, 2.5 million foreign workers each had been recruited. In light of the rapidly deteriorating war situation afterwards, the recruitment of the same number again from January 1943 to autumn 1944 appears impressive and mirrors the increasing ruthlessness in recruitment, especially in Eastern Europe and

the occupied parts of the Soviet Union.⁸³ In January 1942, Fritz Sauckel was appointed ‘General Plenipotentiary for the Employment of Labour’ to maximise employment in the Reich. He initiated several major recruitment drives and claimed to have transferred 1.8 million civilians and POWs had been from Eastern and Western occupied Europe to Germany between April and November 1942. One quarter of these (417,500) were POWs. Herbert considers Sauckel’s figures exaggerated as they denote recruitments and not employments.⁸⁴

Notwithstanding the actual numbers transferred, Saukel’s recruitment drives brought thousands of POW and civilian workers to Germany. Civilian labour transfers exceeded POW transfers by far. Transfers from Eastern Europe and the Soviet Union were particularly substantial. 2.8 million Soviet civilian workers had been deported to the Reich until summer 1944.⁸⁵ In September 1944, only 2.17 million civilian labourers remained in the Soviet territories previously occupied by Germany, implying that Germany had deported 56 per cent of that area’s employable population.⁸⁶ Increasingly brutal coercive recruitment methods after the fall of Stalingrad were met by passive (evasion) and active (partisans) resistance.⁸⁷ Overall, a third of Poland’s and Western Soviet Union’s employable population were transferred to the Reich.⁸⁸ These labour dislocations had severe backlashes for the host economies. For example, the transfer of 21,000 rural workers from Taraschtscha in Southern Ukraine in 1943 to the Reich depleted the region’s population by 15 per cent and created severe rural labour shortages because the remaining labour pool mainly consisted of non-agricultural elderly or juvenile workers.⁸⁹ German occupation officials in Kiev and Prague heavily protested against Sauckel’s labour withdrawals in 1942, arguing that these would severely harm the local economy.⁹⁰

POW worker transfers affected all German-occupied territories. 102,000 Soviet and Polish and 4,000 Yugoslav POWs were shipped to Norway in 1941 to mitigate labour shortages in the construction and aluminium industries. The Yugoslavs experienced especially arduous working conditions as they were captured partisans

⁸³ Herbert, *Fremdarbeiter*, 305

⁸⁴ Ibid, 209-210

⁸⁵ Müller, ‘sowjetische Zwangsarbeiter’, in Herbert, *Europa*, 234

⁸⁶ Ibid, 248, fn 6

⁸⁷ Herbert, *Fremdarbeiter*, 297

⁸⁸ Herbert, ‘Einleitung des Herausgebers’, in Herbert (ed.), *Europa und der Reichseinsatz, ausländische Zivilarbeiter, Kriegsgefangene und KZ-Häftlinge in Deutschland 1938-45*, (1997), 17

⁸⁹ Pfahlmann, *Fremdarbeiter* , 227

⁹⁰ Umbreit, ‘Gebiete’, 219

from Croatia and Serbia. Only a quarter of them survived compared to 85 per cent of the Soviets and Poles.⁹¹ Most Yugoslav POWs, approximately 100,000, were shipped to Germany for employment.⁹² Approximately 500,000 IMIs were transferred to Germany, but 55,000 were also deported for employment to Slovakia and Hungary towards the end of the war.⁹³ POWs and foreign workers were used as substitutes to ease the dislocations caused by skilled worker extractions from occupied territories into the Reich. For example, 70,000 industrial workers from Upper Silesia, of whom 60,000 were coal miners or mining personnel, were drafted into the Wehrmacht from 1942 to 1945. In addition, 15,000 miners from the industrial district Kattowice were transferred to work in the Ruhr in 1941 and skilled workers were frequently coerced into temporarily supporting the construction of public works in other parts of the Reich such as the ‘East wall’ construction or other projects from Organisation Todt.⁹⁴ This massive skilled worker outflow was met by inflows of unskilled Polish civilians, POWs, Soviet civilian workers and concentration camp inmates.⁹⁵ Beginning in 1942, POWs were increasingly transferred to Upper Silesia to work in industry and to cushion the skilled mining labour losses. POW and civilian internee employment in Kattowice’s industry rose by 150 per cent to 94,000 between March 1943 and February 1944. POWs and foreign civilians represented 12.5 per cent of the district’s labour force in 1944. The employment distribution shifted over time in line with labour demand from rural to industrial employment.⁹⁶

POW employment was also maximised to substitute for insufficient civilian labour recruitments. Sauckel planned to transfer 1.5 million Italian workers to the Reich following Italy’s armistice in September 1943. But as only 43,000 had been recruited by July 1944, he released IMIs into civilian status instead. As it had been done with the Polish and Soviet POWs, civilian status entailed increased rations and higher expected productivity.⁹⁷ Most IMIs refused to volunteer, so they were coerced into civilian status in September 1944.⁹⁸ The status change raised productivity as it

⁹¹ Spörer, *Zwangarbeit*, 57

⁹² Lukan, *op.cit.*, 274

⁹³ Spörer, *Zwangarbeit*, 83

⁹⁴ Organisation Todt was a mobile workforce mostly performing work on military defenses in the Reich.

⁹⁵ A. Sulik, ‘Volkstumspolitik und der Arbeitseinsatz – Zwangsarbeiter in der Großindustrie Oberschlesiens’, in Herbert (ed.), *Europa und der Reichseinsatz*, 112–113

⁹⁶ Sulik, *op.cit.*, 113, 117–118

⁹⁷ Herbert, *Fremdarbeiter*, 304 and Cajani, ‘Militärinternierte’, 303

⁹⁸ Cajani, ‘Militärinternierte’, 305

allowed for employment in smaller groups.⁹⁹ Inter-sectoral transfers accommodated seasonal demands and smoothed employment. From 1940 onwards foreign workers and in particular POWs were withdrawn from agriculture when rural labour demands were lower during the winter months to work in the munitions industries.¹⁰⁰ Soviet POWs frequently replaced Western POWs required elsewhere. In September 1941, 10,000 Belgian and French POWs were transferred back to their countries of origin. They had worked in unskilled jobs but were now required in skilled mining jobs. Soviet POWs took their place in Germany.¹⁰¹ Herbert finds this replacement system extremely inefficient given frequent programme changes and disregard of worker's qualifications.¹⁰² Davis also dismisses Nazi Germany's POW labour apparatus as inefficient suffering from administrative confusion and institutional competition for POW labour.¹⁰³ But the attention to skilled labour placements and transfers reveals that despite ideological and administrative inefficiencies, some economic considerations played a role in the Nazi labour allocation system.

Western European civilian worker deportations illustrate the scale of economic disruption caused by the transfers. Table 10 shows that between 1942 and 1944 on average 900,000 French, Belgian and Dutch civilians worked in Germany. Almost 2 million had been deported for employment overall. Compared to its domestic pre-war labour force, Dutch deportations ranked highest in relative terms, although many workers returned home during the war. Coerced deportation intensified from 1943 onwards and peaked in 1945 with the Allied invasion of the western Netherlands, but no reliable data is available post-1944. Van Zanden confirms that mass worker deportations from 1942 onwards contributed to a fall in Dutch economic activity.¹⁰⁴ French civilian and POW deportations were highest in absolute terms at 1.84 million. Overall, including POWs, 13 per cent of the occupied Western European labour force was deported to Germany for employment, inflicting heavy economic losses on the economies of these occupied areas.

⁹⁹ Pfahlmann, *op. cit.*, 70

¹⁰⁰ Pfahlmann, *op.cit.*, 234

¹⁰¹ Pfahlmann, *op.cit.*, 90-91

¹⁰² Herbert, *foreign workers*, 246-7. In one case in Cologne, 220 civilian and POW jobs were reassigned in order to fill 79 vacancies in coal mining.

¹⁰³ Davis, 'Prisoners of War', 628

¹⁰⁴ J. van Zanden, *Economic History of the Netherlands, 1914-1994*, (London, 1998), 123

Labour dislocations depleted the occupied territories civilian labour force substantially, especially in Eastern Europe and the Soviet Union. They disrupted home economies and occupation authorities competed with the Reich for POW and civilian labour. POW labour transfers were less substantial than civilian transfers. Ten to fifteen per cent of Western European labour forces were deported to the detriment of the occupied territories. Eastern European and Soviet data is patchier, but approximately 30 per cent is suggested. POWs substituted for skilled labour withdrawals and ceasing civilian inflows and their transfers spread all over Europe affecting millions of captured soldiers.

Table 10. Civilian labour deportations to Germany from occupied Western territories

Date	French	Belgians	Dutch	Total
20.11.1942	134,518	130,989	153,764	419,271
31.12.1943	666,610	222,851	274,368	1,163,829
30.09.1944	646,421	199,437	254,544	1,100,402
Average (1)	482,516	184,426	227,559	894,501
Aggregate (2)	913,000	375,000	574,500	1,862,500
Share of (1) of pre-war labour force (PLF)	2.5 %	5.9%	6.4 %	4.9 %
Share of (2) of PLF	4.7%	11.9 %	16.3 %	10.9 %
Share of (2) incl. POWs	9.5 %	14.0 %	16.6 %	13.3 %

Sources: Civilian and POW workers:

Der Arbeitseinsatz im grossdeutschen Reich, 1942-44 and Herbert, *Fremdarbeiter*, 296. Averages used for (1).

(2): France and Belgium: Spörer and Fleischhacker, 'compensation', 17-19. French civilians exclude transformed POWs to avoid double-counting; Netherlands: G. Hirschfeld, 'Die niederländischen Behörden und der Reichseinsatz', in Herbert (ed.), *Reichseinsatz*, 181

(3) : France: 931,000 POWs (1942). F. Occhino, K. Oosterlink, E. White, 'How much can a victor force the vanquished to pay? France under the Nazi boot', *Journal of Economic History*, vol.68, no.1 (March 2008), 15.; Belgium: 65,000 POWs; Netherlands: 10,000 POWs in 1944, see text.

Pre-war labour forces:

Belgium: 3,148,104 (1937). G. De Brabander, 'Regionale structuur en werkgelegenheid', Brussels, Koninklijke Academie van België, *Verhandelingen van de Koninklijke Academie voor Wetenschappen, Letteren en Schone Kunsten van België, Klasse der Letteren, jaargang 45, nr. 102* (1983), 36

Netherlands: 3,517,000 (1938). B. van Ark, Jakob de Haan, H. de Jong, 'Characteristics of economic growth in the Netherlands in the post-war period', in Crafts and Toniolo (eds.), *Economic Growth in Europe since 1945* (CUP, 1996), 296, table 10.7

France: 19,500,000 (1938). Jean-Jacques Carré, Paul Dubois and Edmond Malinvaud, *French Economic Growth* (Stanford University Press, 1975), 59

4. The economic impact of POW and civilian labour treatment on occupied territories

Not only the scale of foreign and POW labour exploitation, but also the degree of exploitation through mistreatment was substantial. This section presents a first proxy for the impact of POW treatment. Human capital losses for occupied territories are measured via mortality rates and casualties in relation to pre-war labour forces. This section revises upwards the degree of exploitation quantified by existing studies, provides more accurate country-specific POW mortality rates and illustrates that while Eastern POWs suffered substantially higher mortality rates than Western POWs, the latter were tapped more intensively relative to their country's pre-war labour force. Spörer and Fleischhacker estimate that 11.87 million forced labourers in German hands or 81 per cent survived the war.¹⁰⁵ They employ a significant margin of error of ± 0.75 million or 5 per cent and assume that by mid-1945, 3.4 million POW workers survived the war. Their results, in particular the Soviet ones, are complicated by POW releases into civilian status.¹⁰⁶ Table 11 shows that the majority of foreign workers in Germany were civilian while approximately one third were POWs and that civilians enjoyed the lowest mortality rates. However, since French, Soviet, Polish and Italian POWs were given civilian status over time, foreign civilian and POW labour can be difficult to distinguish. Spörer and Fleischhacker's figures require revision as they exclude POW transformations. Conversely, table 11 includes 850,000 transformed survivors and also illustrates that POWs endured lower mortality rates than concentration camp inmates but significantly higher than civilian labourers. High POW mortality rates primarily stem from the arduous maintenance conditions for Soviet and Polish POWs.

¹⁰⁵ Spörer and Fleischhacker, 'Forced Laborers', 201

¹⁰⁶ Ibid, 189, table 5, 197

Table 11. Foreign labour mortality rates in Nazi Germany, 1939-45

Labour type	Total 1939-45	Survivors mid-1945	Mortality rate
Civilian labourers	8,435,000	7,945,000	15.88 %
POWs	4,575,000	3,425,000*	25.31 %
Concentration Camp inmates	1,550,000	475,000	69.35 %
Working Jews	55,000	30,000	45.45 %
Total	14,615,000	11,875,000	11.90 %

Source: Spörer and Fleischhacker, ‘Forced Laborers in Nazi Germany’, 196, table 8

Note: Spörer and Fleischhacker provide a wrong 1939-45 grand total which is corrected for. Survivors include transformed POWs who then worked in civilian labour battalions.

* Sum of 2,575,000 POW survivors in mid-1945 and 850,000 ‘transformed’ POW survivors. The attained POW mortality rate is lower than that of Spörer and Fleischhacker.

Data is compiled from different country-specific sources to obtain more accurate mortality rates for all POW groups in German hands. POW employment numbers are drawn upon if POW holding data is not available for one group. Tables 12 and 13 demonstrate the racial hierarchy described in Section One. Belgian, French and Anglo-American POWs lead that hierarchy and progressively higher mortality rates mirror the inferior treatment of Italian, Eastern European and finally Soviet POWs. Although French and Soviet POW workers were used in similar magnitudes, only half of the Soviets survived captivity in contrast to 97 per cent of the French.

Table 12. Mortality rates and POW numbers in German hands, 1939-1945

<i>POW type</i>	<i>POW numbers</i>	<i>POW deaths</i>	<i>Mortality rate</i>
British and US ^a	231,889	8,348	3.6 %
French ^b	1,600,000	37,054	2.3 %
Belgian ^c	65,000	1,700	2.6 %
Dutch ^d	13,000	400	3.0 %
Serbs	110,000	5,000	4.5 %
Italians ^e	460,000	32,000	6.9 %
Poles ^f	300,000	80,000	27.0 %
Soviets ^g	5,700,000	3,300,000	58.0 %
Total	8,400,000	3,460,000	41.0 %
Total occupied countries (excl. UK&US)	8,200,000	3,460,000	42.0 %

Sources: Spörer and Fleischhacker, 'Forced Laborers', 185, table 3 except for notes below.

Notes:

^a Spörer and Fleischhacker, *ibid* give 1,851 UK deaths and 0.8% mortality while Streit *Kameraden*, 296, fn 33-35 gives 1,987 until January 1945 and 8,348 until May 1945. Latter seems more realistic.

^b Durand gives a range of 1.6-1.9 million as exact French POW numbers are unknown; minimum is used here. Durand, 'Das Schicksal der französischen Kriegsgefangenen in deutschem Gewahrsam, 1939-45', in Overmans and Bischof, *op.cit.*, 71

^c Spörer and Fleischhacker, 'Compensation', 17

^d These were only held captive from summer 1943 onwards. 2-3,000 were repatriated before liberation. L.DeJong, *Het Koninkrijk de Nederlanden in de Tweede Wereldoorlog* (Den Haag, 1969-91), vol.VIII, 866

^e 960,000 Italians employed overall. 460,000 were IMIs of whom 32,000 died in German custody. G.Schreiber, *Die Italienischen Militärinternierten im deutschen Machtbereich 1943 bis 1945. Verraten, verachtet, vergessen* (München 1990), 305-312, 579

^f 220,000 of 300,000 Polish POWs survived in mid-1945. Spörer and Fleischhacker, *op.cit.*, 189, table 5

^g Müller, 'Die Behandlung sowjetischer Kriegsgefangener durch das deutsche Reich, 1941-45', in Overmans and Bischof (eds), *op.cit.*, 285

Table 13. Eastern and Western POW mortality in German hands

POW type	POW number	POW deaths	Mortality rate
Western POWs	2,369,889	79,502	3.35 %
Eastern POWs	6,110,000	3,385,000	55.40 %

Source: Table 9. Note: Eastern POWs: Soviet, Yugoslavian, Polish; Western POWs: American, British, Belgian, French, Dutch, Italian.

Soviet POWs suffered by far the most in terms of mortality rates as less than half returned from German captivity. Losses are heavily skewed towards Eastern Europe and the Soviet Union, but the average mortality rate of 42 per cent clearly had a negative aggregate economic effect on occupied countries. Harrison, comparing aggregate losses of human and physical capital during World War Two for USA, Britain, USSR, Germany, Italy and Japan, finds that Japan and Russia suffered the greatest losses. He measures human asset losses as total war deaths divided by the pre-war population. While the US and Britain lost one per cent of their pre-war population each, the USSR suffered between 18 and 19 per cent. This is approximately twice the size of German losses at nine per cent and three times as large as Japan's losses at six per cent.¹⁰⁷ Harrison includes emigration in 'war losses' as he assumes that post-war and wartime emigrants are lost to the country of origin's economy.¹⁰⁸ Emigration or rather post-war non-immigration back home of ex-Soviet POWs was substantial. In light of this and of the extraordinarily high Soviet POW mortality rate, Harrison's larger estimate should be used. The exogenous shock of war therefore destroyed a fifth of the Soviet Union's population. Zamangi concludes that Italian human capital losses were modest. Military and civilian casualties were lower than in World War One and she places tangible and intangible human capital losses at 8 billion Lira or 1.3 per cent of the 1938 capital stock.¹⁰⁹

POW war losses are compared to aggregate pre-invasion domestic workforces to attain a more precise measure of exploitation and the economic impact of POW

¹⁰⁷ Mark Harrison, 'The economics of World War II: An overview', in Harrison (ed.), *op.cit.*, 36, 37, table 1.11

¹⁰⁸ Harrison, 'The Soviet Union: The defeated victor', in Harrison (ed.), *op.cit.*, 293, table 7.13

¹⁰⁹ Vera Zamangi, 'Italy: How to lose the war and win the peace', in Harrison(ed.), *op.cit.*, 212-214

treatment. Liberman examines occupied territory labour exploitation. He uses the civilian and POW labour shares of domestic populations as a yardstick for exploitation, finding that on average 3 per cent of the ‘home population’ of Nazi occupied territories was deported to Germany by 1943. However, he does not compare forced labour groups to their ‘domestic labour forces’ as he alleges but to total population.¹¹⁰ This produces an understatement of labour exploitation. The significantly higher civilian findings in Western Europe above of 10 to 15 per cent more fully reflect the effects of dismembering parts of the economy through labour extraction. In order to determine POW shares of pre-war labour forces of further occupied countries where no pre-war figures are available, unemployment shares by Maddison are combined with Spörer’s absolute unemployment numbers to infer absolute pre-war labour forces.¹¹¹ No such figure was available for Serbia, so shares are understated as population is used. Table 14 demonstrates that France, Italy, Belgium and Poland suffered much less in terms of POW deaths compared to the Soviet Union in relation to their pre-war labour force. However, countries who suffered least in this category had a higher share of their pre-war labour force as coerced workers in Nazi Germany. Absolute human capital losses were smaller for them but at the same time usage of their POW labour was more extensive. In terms of human capital stock destroyed, they suffered less post-war than the Soviet Union but Nazi Germany also benefited more from their POW labour during the war.

Modest POW losses are in many cases overshadowed by civilian losses. Serbia and Montenegro for instance lost 310,000 or 4 per cent of the population between April 1941 and May 1945. 3.5 per cent of inner Serbia’s and almost 12 per cent of Montenegro’s population perished.¹¹² Serbian POWs represented about 2.75 per cent of Serbia’s population upon invasion in 1941.¹¹³ They encountered arduous deportation and employment conditions, but their casualties appear relatively small compared to Serbian and Soviet civilian deaths. Conversely, the 3.3 million Soviet POW deaths account for a third of all military casualties of 8.7 million and for a tenth

¹¹⁰ P. Liberman, *Does Conquest Pay? The exploitation of occupied industrial societies*, (Princeton, 1996), 45

¹¹¹ These inferred results are almost identical to official labour statistics from the Netherlands, France, Belgium and Britain, so they are deemed reliable.

¹¹² Walter Lukan, Ljubinka Trgovcevic, Dragan Vukcevic, ’Serbien und Montenegro: Raum und Bevölkerung - Geschichte - Sprache und Literatur - Kultur - Politik - Gesellschaft - Wirtschaft – Recht’, *Osthefte / Sonderband, Volume 18*, 2006, 294-5

¹¹³ Ibid. Inner Serbia’s population in 1941 was approximately 4 million.

of aggregate Soviet war casualties now estimated at 26.6 million including emigration.¹¹⁴

Table 14. POW deaths and employment in relation to pre-invasion labour forces

Occupied country	POW deaths as % of pre-war labour force	Share of peak POW employment in Germany of pre-war domestic labour force
Soviet Union	3.80 %	0.72 %
Poland	0.50 %	1.86 %
France	0.19 %	4.98 %
Belgium	0.05 %	2.06 %
Dutch*	0.01 %	0.40 %
Italy	0.17 %	2.05 %
Serbia	0.12 %	2.75 %

Sources: Pre-war labour forces: Poland, Italy: Maddison, *Economic Growth in the West* (London 1964), 219; Spörer, *Zwangsarbeiter*, 29. Soviet Union: Harrison, *op.cit.*, 285; Belgium, France, Netherlands: Table 7. Serbia: See text. Peak POW employment figures from various sources above.

Note: Pre-war denotes 1938 except for Belgium (1937), Soviet Union (1940), Serbia (1941).

* Dutch POW status commenced in 1943.

Lberman argues that in monetary terms the usage of French civilian and POW labour in Germany increased Germany's total wartime gain in terms of occupation payments by 8 per cent. Pre-war value of France's lost labour was estimated at 63 billion Francs excluding POWs. White, Occhino and Oosterlinck estimate that in 1942 alone, the withholding of French labour cost France 3 per cent of GDP.¹¹⁵ These examples seem to confirm van Zanden's remark that labour deportations reduced the economic activity of occupied territories. POW and civilian labour deportations to the Reich and their mistreatment thus inflicted significant measurable and immeasurable economic damage on the host economies and the exploitation in terms of labour force shares withdrawn from occupied territories was larger than previously assumed.

¹¹⁴ Working population was 86.8 million in 1940. Harrison, *op.cit.* 285, table 7.8.

¹¹⁵ Occino, Oosterlink, White, 'Vanquished', 33

5. Conclusion

Nazi Germany derived a significant economic benefit from the POW labour force in its hands. Its war economy benefited from its sheer size, mobility and favourable productivity and cost functions. Nazi ideology and labour demand produced mostly arduous employment conditions which varied significantly by sub-group and deteriorated univocally as Germany's defeat drew nearer. French, Soviets and Italians provided the largest POW labour groups. While POWs were less productive than German civilians and productivity differed heavily by sub-group, new calculations have shown that they were on average 50 to 70 per cent as productive. If transformations from POW to civilian status are included, 2.3 million POWs worked in the Reich at peak in 1944 rather than 1.8 million suggested by previous authors. The POWs worked 1.8 billion man-days between 1939 and 1945, at peak made up 5 per cent of the German workforce and contributed 1.7 per cent to GNP. Their average contribution during 1940-44 was 1.5 per cent. This constitutes only a third of peak labour force shares, so the net POW labour contribution appears low. But the prisoners replaced German civilians who had been called up in agriculture and increasingly in industry as the war progressed, so the prisoners' withdrawal would have severely harmed the German war economy. Labour exploitation of foreign civilians was even greater and a tentative computation suggests up to 7 per cent of Germany's wartime GNP was produced by foreign and POW labour.

The dislocation of POW and civilian labour from occupied territories reduced economic activity both in Western and Eastern Europe and the Soviet Union. The human capital stock was reduced through casualties and its quality lowered by skill mismatch and mistreatment. Eastern European countries and the Soviet Union suffered by far the most from occupation effects. Less than half of all Soviet POWs did not survive German captivity compared to 3 per cent of Western POWs. The economic losses of occupied countries in terms of labour and population were inversely related to the treatment their POWs enjoyed in German hands. Occupied countries that suffered lower POW mortality rates had a higher proportion of their pre-war labour force deported to Germany for employment. The large-scale system of labour deportation and exploitation constituted a gain for Nazi Germany and a loss for occupied territories. POW and civilian labour exploitation compared to domestic

labour forces was greater than Liberman has acknowledged. The Reich provided a market-like environment in which foreign and POW labour was transferred according to labour demand. The allocation process was inefficient and employment conditions mostly extremely arduous, but POWs and foreign workers presented desirable mobile and controllable substitutes for German civilians required in war-relevant industries or on the front line. POW abuse amplified economic losses. Mistreatment depleted the occupied countries' human capital both in quantity and quality. This double loss - wartime economic dislocation and post-war labour force depletion and distortion - was the consequence of the large scale economic POW and foreign labour exploitation by Nazi Germany. The exploitation of POW labour as part of the foreign labour force was a key element for the German war economy.