The effects of bombing on the economy were both direct and indirect. The direct physically reduced the quantity of weapons and equipment flowing from German factories; the indirect forced the diversion of resources to cope with bombing, resources which German industry could have turned into tanks, planes and guns. Direct effects were felt from both area bombing and precision bombing, as the city attacks hit water, gas and electricity supplies, cut railway lines, blocked roads, or destroyed smaller factories producing components. Much of this, it is true, could be made good within weeks, sometimes within days. But for the German manager in the last two years of war there were two battles to fight: a battle to increase production, and a battle against the endless inconveniences produced by bombing, the interruptions to work, the loss of supplies and raw materials, the fears of the workforce. Where the businessman in America or Britain could work away at the task of maximising output, German managers were forced to enter an uncomfortable battlefield in which they and their workers were unwitting targets. The stifling of industrial potential caused by bombing is inherently difficult to quantify, but it was well beyond the 10 per cent suggested by the post-war bombing survey, particularly in the cluster of war industries specifically under attack. At the end of January 1945 Albert Speer and his ministerial colleagues met in Berlin to sum up what bombing had done to production schedules for 1944. They found that Germany had produced 35 per cent fewer tanks than planned, 31 per cent fewer aircraft and 42 per cent fewer lorries as a result of bombing. The denial of these huge resources to German forces in 1944 fatally weakened their response to bombing and invasion, and eased the path of Allied armies.69

The indirect effects were more important still, for the bombing offensive forced the German economy to switch very large resources away from equipment for the fighting fronts, using them instead to combat the bombing threat. By 1944 one-third of all German artillery production consisted of anti-aircraft guns; the anti-aircraft effort absorbed 20 per cent of all ammunition produced, one-third of the output of the optical industry, and between half and two-thirds of the production of radar and signals equipment. As a result of this diversion, the German army and navy were desperately short of essential radar and communications equipment for other tasks. The bombing also ate into Germany's scarce manpower: by 1944 an estimated two million Germans were engaged in anti-aircraft defence, in repairing shattered factories and in generally cleaning up the destruction.70 From the spring of that year frantic efforts were made to burrow underground, away from the bombing. Fantastic schemes were promoted which absorbed almost half of all industrial construction and close to half a million workers.71 Of course, if German efforts to combat the bombing had succeeded the effort would not have been wasted. As it was the defences and repair teams did enough to keep production going until the autumn of 1944, but not enough to prevent the rapid erosion of German economic power thereafter, and not enough to prevent the massive redirection of economic effort from 1943. Bombing forced Germany to divide the economy between too many competing claims, none of which could, in the end, be satisfied. In the air over Germany, or on the fronts in Russia and France, German forces lacked the weapons to finish the job. The combined effects of direct destruction and the diversion of resources denied German forces approximately half their battle-front weapons and equipment in 1944. It is difficult not to regard this margin as decisive.
The impact of bombing on morale is a different question altogether. The naive expectation that bombing would somehow produce a tidal wave of panic and disillusionment which would wash away popular support for war and topple governments built on sand, was exposed as wishful thinking. Neither in Germany nor Japan did bombing provoke any serious backlash against the regime from those who suffered. But there can surely be little doubt that bombing was a uniquely demoralising experience. No one enjoyed being bombed. The recollections of its victims are unanimous in expressing feelings of panic, of fear, of dumb resignation. The chief ambition of ordinary Germans in the last years of war was survival, das Überleben, the desperate struggle to secure food and shelter, to cope with regular and prolonged cuts in gas and light, to keep awake by day after nights of huddling in cramped shelters.\(^{72}\) The last thing on the minds of those living under the hail of bombs was political resistance. Not even the prospect of vengeance against the bombers could sustain morale.\(^{73}\) Bombed populations developed an outlook both apathetic and self-centred; each night they hoped that if there had to be bombing, it would be on someone else.

If the real thing was not bad enough, the survivors were subjected to a second bombardment when the war was over, this time of surveys and questionnaires. Ordinary Germans and Japanese were selected for close interrogation by an army of American officials, anxious to learn at first hand what being bombed felt like. The Irish-American writer James Stern was among their number. He found the fatuous questions and the endless stream of tired, unhappy, defeated Germans almost more than he could bear. ‘What do you do and say with all that Galluping nonsense on the table to be answered?’ he wrote two years after the war, ‘and across the table the forlorn life with nothing to live for . . .’ Nevertheless Stern, and a host of others, went on to extract the answers.\(^{74}\) They were in the main predictable. Many Japanese respondents placed bombing at the top of the list of factors that had made them doubt the possibility of victory (34 per cent of those polled). In a second poll on ‘Reasons for Certainty that Japan Could Not Win’ 47 per cent put bombing.\(^{75}\) In Germany, 36 per cent of interviewees explained the decline of morale by the impact of bombing, and one out of three claimed that their personal morale was affected by bombing more than by any other single factor. When they were asked the more specific question ‘What was the hardest thing for civilians during the war?’, 91 per cent said bombing.\(^{76}\)

The impact of bombing was profound. People became tired, highly strung and disinclined to take risks. Industrial efficiency was undermined by bombing workers and their housing. In Japan absenteeism from work rose to 50 per cent in the summer of 1945; in the Ford plant in Cologne, in the
Ruhr, absenteeism rose to 25 per cent of the workforce for the whole of 1944. At the more distant BMW works in Munich the rate rose to one-fifth of the workforce by the summer of 1944. A loss of work-hours on this scale played havoc with production schedules. Even those who turned up for work were listless and anxious. 'One can't get used to the raids,' complained one respondent. 'I wished for an end. We all got nerves. We did not get enough sleep and were very tense. People fainted when they heard the first bomb drop.' For the bombed cities the end of the war spelt relief from a routine of debilitating terror and arbitrary loss. No one could doubt who walked through the ghost towns of Germany and Japan, past the piles of rubble and twisted concrete, the rusting machines and torn up rails, miles and miles of burned-out houses, their few frightened inhabitants eking out a half-life in the cellars and ruined corners, no one could doubt but that bombing shattered civilian lives.

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There has always seemed something fundamentally implausible about the contention of bombing's critics that dropping almost 2 5 million tons of bombs on tautly-stretched industrial systems and war-weary urban populations would not seriously weaken them. Germany and Japan had no special immunity. Japan's military economy was devoured in the flames; her population desperately longed for escape from bombing. German forces lost half of the weapons needed at the front, millions of workers absented themselves from work, and the economy gradually creaked almost to a halt. Bombing turned the whole of Germany, in Speer's words, into a 'gigantic front'. It was a front the Allies were determined to win; it absorbed huge resources on both sides. It was a battlefield in which only the infantry were missing. The final victory of the bombers in 1944 was, Speer concluded, 'the greatest lost battle on the German side ...' For all the arguments over the morality or operational effectiveness of the bombing campaigns, the air offensive was one of the decisive elements in Allied victory.
The fate of German military technology provides one of the central paradoxes of the war. Germany was without doubt a modern state by the standards of the 1940s, but her forces were stage by stage deprived of the modern weapons they needed. While German scientists pioneered the world's most advanced weapons - rockets, jets, atomic weapons - German forces lacked adequate quantities of the more humdrum petrol-driven equipment. Only later in the war was an effort made to change this balance,

but by then the attrition ratio was too far in favour of the Allies to be reversed. Billions of marks were spent on projects at the very frontiers of military science which brought almost no strategic advantage whatsoever.

The paradox can be explained in part by the warped outlook of Germany's leaders, who persuaded themselves as the war began to turn against them that German science could conjure up a new generation of fantastic weaponry that could reverse the war's course at a stroke. 'Retribution is at hand,' Goebbels told Party leaders in February 1944. 'It will take a form hitherto unknown in warfare, a form the enemy will find impossible to bear.' Towards the end of 1944 Himmler tried to revive atomic bomb research, and to develop a new chemical weapon, the new incendiary 'N-material' that was literally inextinguishable. All these projects absorbed men and materials that would have been much better spent in conventional fields, but the fantasy of secret weapons helped to cushion the reality of impending defeat.

There is a second explanation: the German armed forces pursued technical excellence for its own sake. By the late 1930s they had developed the weapons that would in the main be used to fight the Second World War. They were now keen to move on to the next technical threshold to keep ahead in the arms race. At the outbreak of the war they were already at the very starting edge of the world of jets and missiles. When the war came they tried to speed the process of development up, to win the war with the weapons of the 1950s. The result was a technical disaster: shortages of resources, constant political interference, the inherent difficulty of accelerating research work at the forefront of science, all meant that German forces got little in terms of performance from the new weapons to match the great expense of producing them. The Allies - except for the Manhattan atomic project - stuck with the weapons of the late 1930s, and pushed them successfully to their limits, in most cases overtaking the performance of Germany's more conventional weaponry. When after the war they came to develop missiles, jets, advanced submarine technology, and a host of other vanguard equipment, they simply took German scientists and blueprints.

By contrast with Germany, the Soviet Union was far less modern, though the difference is often prone to exaggeration. But over the course of the war very great strides were made in all fields of advanced technology. Hundreds of thousands of poorly-educated, technically illiterate Soviet citizens were trained to drive trucks and tanks, or fly some of the world's fastest aircraft. The Soviet Union had nothing to lose and everything to gain by upgrading her manpower and equipment. For twenty years Soviet communism had preached the virtues of modernisation as the answer to all the country's
problems. Now the gospel was needed more than ever. The struggles of collectivisation and industrial transformation became the struggle for military progress. Soviet soldiers were tough, used to harsh conditions of life and few luxuries. When that hardiness was married to modern technology the mix proved much more effective than many in the west had thought possible. When John Erickson, later a distinguished historian of that modernisation, first confronted the Red Army as a young infantry sergeant in 1945 he was struck by the curious blend he beheld: ‘an army of unwashed, uncouth, lithe Ukrainians, squat riflemen from the central Asian republics, combat medals a-jingle, cradling superb self-loading rifles—but, above all, the tanks in their fungicidal green colouring, the paint just slapped on over those powerful turreted guns’. In the end the Soviet army proved just modern enough; but German forces were too modern for their own good.
The history of the Nuremberg Tribunal exemplifies the moral contrast between the two sides (and the awkward morality behind a victorious coalition of democratic and communist powers). The indictments were an extension of the Allied conviction that they had fought a just war against aggression and barbarism. The justness was demonstrated by the fact that the victors had not, as Justice Jackson put it, exacted immediate vengeance while 'flushed with victory and stung with injury', but had submitted their case to the due process of law. The same procedure was adopted when Japan's leaders were brought before a second International Tribunal, at which a catalogue of appalling atrocities against civilians and soldiers was paraded in horrifying detail. The revelations in both trials confirmed the picture created during the war to sustain the Allied war effort, of primitive savages in the east, and devious barbarians in Europe. This image had both simplified and strengthened the Allied cause. During the war, hatred of Hitlerism papered over the deep cracks in the Allies' own coalition of interests and ideologies, and it continued to do so, if falteringly, during the trials. It was a hatred that had sustained the most significant moral effort of the war, the mobilisation of the Soviet will to win. Whatever the rights and wrongs of the Allied cause, the belief that they fought on the side of righteousness equipped them with powerful moral armament.

There were many on the Axis side who would have agreed. War was not widely welcomed, nor were its purposes understood. Popular propaganda was distrusted. A hard core of enthusiasts saw the war as a way to impose a brazen 'new morality', rooted in racism, violence and enslavement. But many more continued to fight only through fear, or struggled, like the German resistance, to reassert a conventional morality. As the war deteriorated for the Axis states, the instruments of terror were turned on their own people and soldiers. They fought from sheer survival instinct, but the underlying moral dilemma of fighting an aggressive war in which brutalisation and atrocity had become routine was inescapable. The repeated efforts to murder Hitler revealed a system divided against itself, just as the wave of suicides at the war's end surely revealed uncomfortable consciences. Historians are loth to pronounce on moral issues, even where the balance of right and wrong seems clear-cut. But can there be any doubt that populations will fight with less effect in the service of an evil cause?