

REVITALIZING NORDIC MANUFACTURING

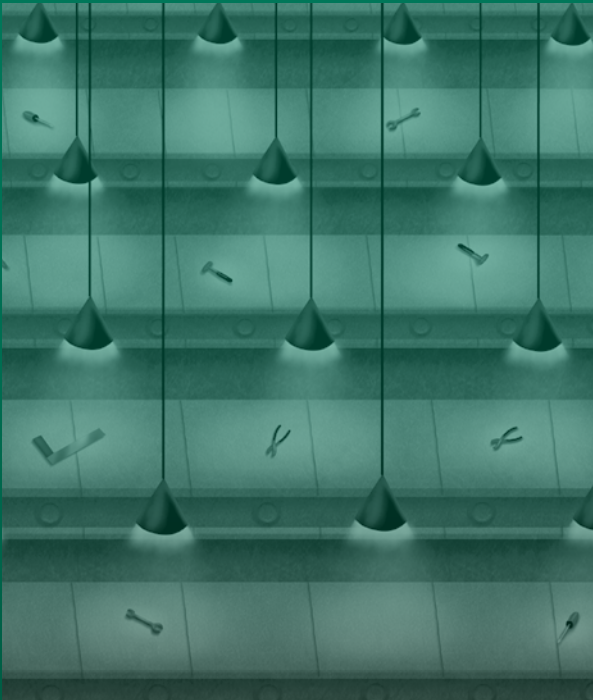
WHY DECISIVE ACTION IS NEEDED NOW



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INTRODUCTION

BY MANY MEASURES, THE economies of Denmark, Finland, Norway, and Sweden are among the most envied in the world. The nations boast some of the highest per capita incomes and health and education standards, and they consistently score at or near the top in international competitiveness and innovation rankings.

But these four Nordic nations also share an economic vulnerability: manufacturing sectors that are in serious decline.¹ Without urgent policy action on a number of fronts, the erosion of manufacturing in Denmark, Finland, Norway, and Sweden is likely to continue—and may well accelerate. If it does, the potential economic and social impact on the region would be considerable: manufacturing has historically been a critical driver of economic growth, employment, and strong trade balances for most Nordic economies.

Nordic governments have for years shifted their focus to the service sector, hoping to create new, higher-value jobs through measures such as increased investment in education. So far, however, new service-sector jobs have failed to offset job losses in manufacturing. This has led to higher overall unemployment in all four Nordic economies, but the impact has been especially severe in smaller manufacturing towns, where workers tend to be less well educated and less mobile than in urban areas.

A decline in manufacturing employment is hardly unique to the Nordic region, of course. Factories have been shedding workers for years virtually everywhere in the world—China included—as production lines become automated and services assume a greater share of the economic pie. But the prospects for Nordic manufacturing are particularly disturbing and stand in stark contrast to those of other developed economies, particularly Germany and the U.S. Indeed, research by The Boston Consulting Group suggests that reshoring and higher exports could add 2.5 million to 5 million jobs to the U.S. economy by the end of the decade because of improved cost-competitiveness. (See “Why America’s Export Surge Is Just Beginning,” BCG article, September 2012.)

Part, but not all, of this divergence is due to key structural differences between the Nordic economies and other industrial powers. The U.S. and Germany have large domestic markets that consume a major share of manufacturing output, for example. Nordic manufacturers, with the exception of those that produce for the domestic oil-and-gas market, generally rely heavily on exports. U.S. manufacturers have also benefited from a weak currency.

The chief handicaps of Nordic manufacturing are declining cost competitiveness and relatively inflexible labor rules in most countries. Manufacturing labor costs in Germany are around 20 percent lower than the Nordic average, while in the U.S. they are around 40 percent lower. Eastern European labor costs are around 80 percent lower than the Nordic average. Regulation of the labor market, meanwhile, is less flexible in Sweden, Finland, and Norway than in the rest of Western Europe. A key result of these labor regulations is that companies, particularly small and midsize enterprises, avoid new permanent hiring unless absolutely necessary. This trend is evident in the rapid aging of manufacturing workforces.

Other factors are also weakening the competitiveness of Nordic manufacturing. The region's cost advantage in energy is starting to diminish. Logistics costs for goods shipped within Europe from Nordic countries are higher than for goods shipped from competing economies. The returns from Nordic investment in research and development are declining. And global demand for manufactured goods is shifting from mature Western economies—the prime markets for Nordic producers—to rapidly developing economies in Asia.

The combination of shifting demand and lower production costs in emerging markets provides a strong incentive for Nordic companies to keep moving production jobs offshore. The continued escalation of manufacturing wages in the Nordic economies suggests that policymakers and unions underestimate the long-term consequences of high costs to the region's manufacturing sector.

Without action to address these challenges, the impact of the continuing exodus of Nordic manufacturing is likely to be severe. We project that Nordic economies stand to lose 200,000 manufacturing jobs over the next five to seven years under a business-as-usual scenario. That would correspond to around 13 percent of the nearly 1.6 million total manufacturing jobs in these nations at the end of 2011 and to 2 percent of total employment.

We see the need for a “new deal” for manufacturing in the Nordic region. The priorities for each economy are different. But the overarching objectives should be to ensure competitive conditions for domestic companies, to create an attractive environment for next-generation manufacturers, to maintain and expand skilled workforces, to promote the growth of midsize companies, and to help entrepreneurs commercialize their innovations and start new companies.

The starting point for this new agenda is to appreciate both the critical economic role that manufacturing still plays in the Nordic region and the contribution it can make to ensuring vitality in the future.

NOTE

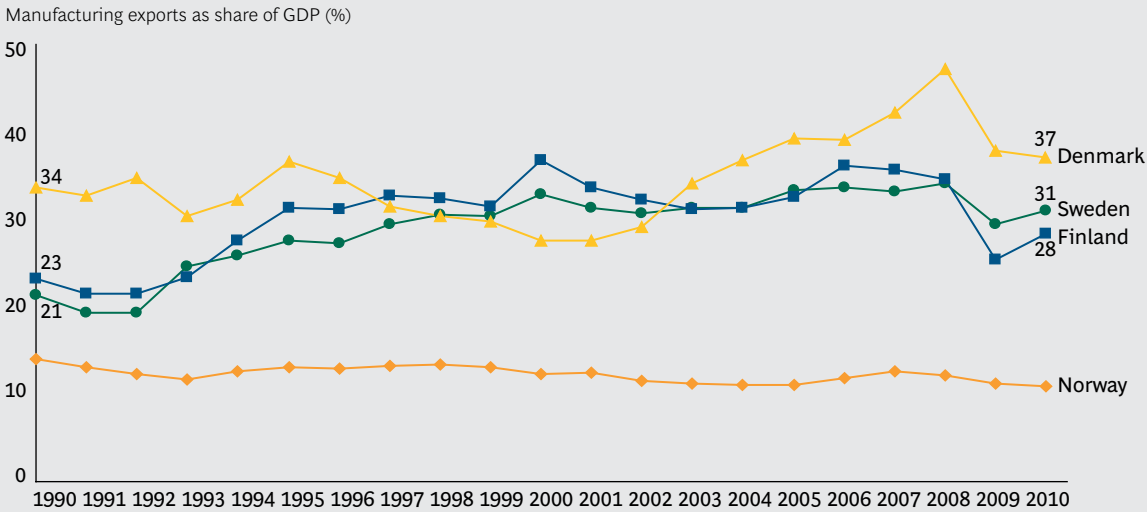
1. For the purposes of this report, the terms “Nordic” and “Nordic region” refer only to Denmark, Finland, Sweden, and Norway.

THE NORDIC MANUFACTURING LANDSCAPE

MANUFACTURING HAS BEEN A foundation for economic growth and social welfare in the Nordic region since World War II. Manufacturing has also powered exports, an increasingly important driver of economic growth in Denmark, Sweden, and Finland. Manufacturing accounts for about three-quarters of Denmark's exports, which now make up about half of the nation's GDP, compared with around 30 percent in the 1960s. Since 1990, total manufacturing exports have risen from around 20 percent of GDP in Sweden and Finland to about 30 percent. (See Exhibit 1.)

The Nordic economies have many strengths. One is a strong record of macroeconomic stability. Each economy has low public-debt levels—under 55 percent of GDP—and collects tax revenues ranging from 43 percent to 48 percent of GDP, compared with a world average of 35 percent. Each of the four Nordic nations scores high in international rankings of political stability and ease of doing business. For some of these reasons, Norway scored highest among 150 nations in the BCG Sustainable Economic Development Assessment (SEDA) in terms of current level of develop-

EXHIBIT 1 | Manufacturing Exports Are an Increasingly Important Driver of GDP in Denmark, Sweden, and Finland



Sources: OECD; Economist Intelligence Unit.

ment. Sweden, Finland, and Denmark all scored in the top ten. (See *From Wealth to Well-Being: Introducing the BCG Sustainable Economic Development Assessment*, BCG report, November 2012.)

The Nordic manufacturing sector also can draw upon valuable assets. The region is rich in talent: each of the economies, but particularly Finland, ranks among the elite in terms of education quality. Each economy also has world-class manufacturing operations. All four are among the top 15 in the World Economic Forum’s Global Competitiveness Index 2012–2013 rankings.

The region also has a strong research base. Sweden, Denmark, and Finland have been among the world’s biggest spenders on research and development in both the public and private sectors. (See Exhibit 2.) Gross R&D spending in Finland equals around 4 percent of GDP, for example. This compares with less than 3 percent for the U.S., Germany, France, and the U.K. Not coincidentally, the four Nordic nations occupy four of the top nine spots among 37 European nations in the *Global Innovation Index 2012* rankings.

Snapshots of the Nordic Economies

Beyond these broad commonalities, however, are structural differences among the manu-

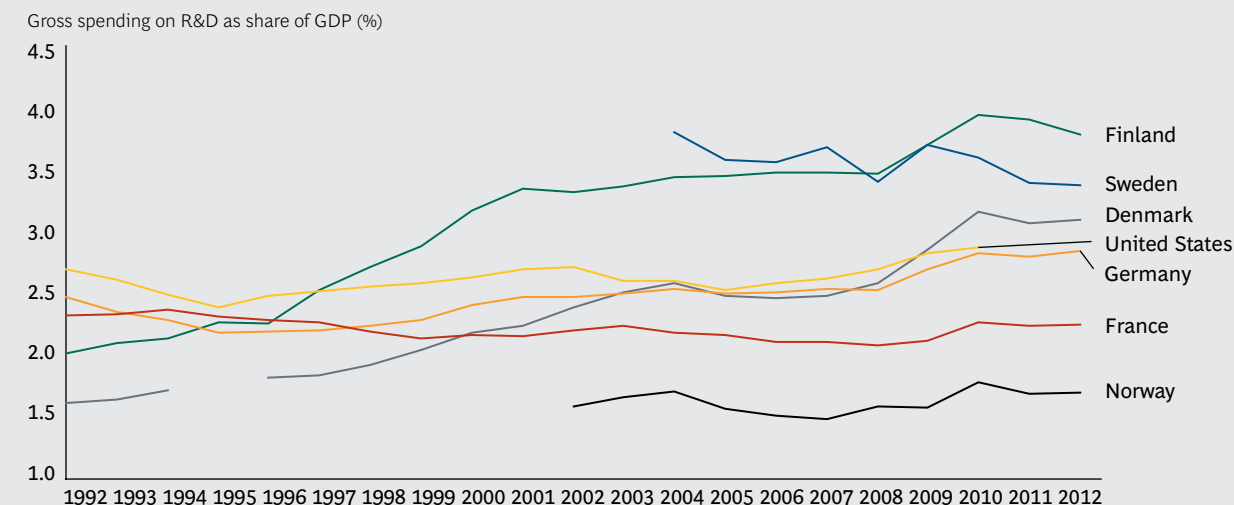
facturing sectors of Denmark, Finland, Norway, and Sweden. They include different currencies, competitive strengths, and labor environments, as well as varying degrees of dependence on exports and natural resources. As a result, each nation has its own set of challenges and policy priorities.

Denmark. The key industries in Denmark include machinery and equipment, food and beverages, transportation equipment, and metals. Of the four Nordic economies, Denmark depends the most on exports, shipping 73 percent of manufacturing output abroad. Manufacturing exports account for around 35 to 40 percent of Denmark’s GDP, compared with about 30 percent a decade ago.

Denmark also posts perennial manufacturing trade surpluses. Denmark’s strengths include abundant talent and relatively flexible labor laws, as well as strong investments in R&D. But due to its high salaries, strong currency, and elevated energy costs, Denmark has lost cost competitiveness in the past decade, particularly when compared with Sweden and Germany.

Finland. Finland exports 48 percent of its manufacturing output. Among the key industries that are in good financial health are electronics, machinery and equipment, and chemicals. The wood and paper product sectors, however, are struggling. The largest

EXHIBIT 2 | Sweden, Finland, and Denmark Are World Leaders in R&D Investment



export companies in Finland are found in the following industries: paper (UPM, Stora Enso, Metsä Group), metals (Outokumpu and Rautaruukki), and machinery manufacturing (Kone, Wärtsilä and Metso).

Finland's competitive strengths include strong talent, affordable energy, access to natural resources, and well-established R&D linkages among industry, universities, and government-funded research institutes. Several Finnish organizations support international business, such as Finpro, Invest in Finland, FinNode, Finnvera, the Ministry for Foreign Affairs, the Ministry of Employment and the Economy, and the Ministry of Education and Culture.

These organizations are good in their own fields, but collaboration among them is less than ideal. Representatives of the industrial companies we talked with regard Finnish bureaucratic efforts to improve competitiveness as scattered and weak, and they feel that the government does a poor job of setting common goals and priorities. Better cooperation among the public and private sectors is especially needed to support promising small and midsize companies and global expansion.

Norway. Compared with the other three Nordic economies, Norway depends less on manufacturing for employment. The oil-and-gas industry drives the Norwegian economy. Traditional manufacturing industries—such as wood products, furniture, fabricated metals, and foods—depend heavily on access to domestic natural resources. Norway also has healthy machinery and transportation-equipment industries.

While the nation has some of the region's highest labor costs, its advantages include very well-educated talent, high productivity, state-of-the-art technology, and affordable energy costs. An impressive degree of public-private collaboration on R&D is giving rise to innovation clusters in the energy and maritime industries. Norway spends much less on R&D as a percentage of GDP than its Nordic neighbors. But this is partly because Norway has a higher GDP per capita than other Nordic economies owing to its significant oil and

gas revenues. Norway ranks much higher in R&D spending per capita.

Sweden. The Swedish industrial base is well diversified, and nearly 60 percent of manufacturing output is exported. Key Swedish industries include machinery and equipment, automobiles, basic materials, and medical equipment. Sweden has traditionally based competitiveness on a comprehensively trained talent base, high levels of automation, a great deal of R&D spending, and access to resources such as metals, wood, and competitively priced energy. Sweden is one of the most cost-competitive Nordic countries and is on a par with Germany.

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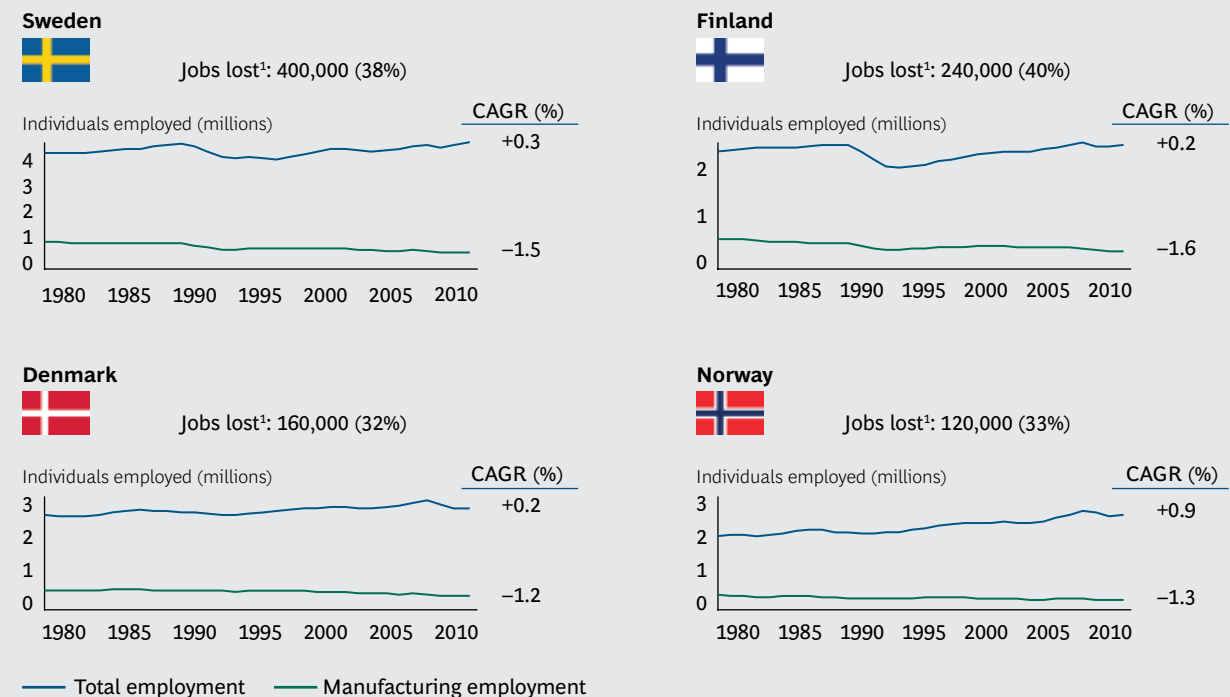
Large companies dominate Sweden's manufacturing sector: around half of all manufacturing jobs are in companies with more than 250 employees. Increasingly, these companies are investing outside the country, however, and small and midsize manufacturers are not growing sufficiently to replace the jobs that are lost as a result.

What's more, the average age of manufacturing workers has risen by eight years since 1985 because not enough Swedish youths are entering the industrial workforce. This development threatens Sweden's talent advantage in the medium term and may make it difficult to maintain high productivity despite relatively large salaries.

The Shrinking Manufacturing Workforce

In spite of the region's competitive strengths, Nordic manufacturing employment has been shrinking for decades. From 1980 to 2010, the four nations shed nearly 1 million production jobs—a decline of almost 40 percent. Sweden alone has lost around 400,000 manufacturing jobs since 1980, and Finland has shed around

EXHIBIT 3 | Nordic Companies Lost Approximately 1 Million Manufacturing Jobs from 1980 to 2010

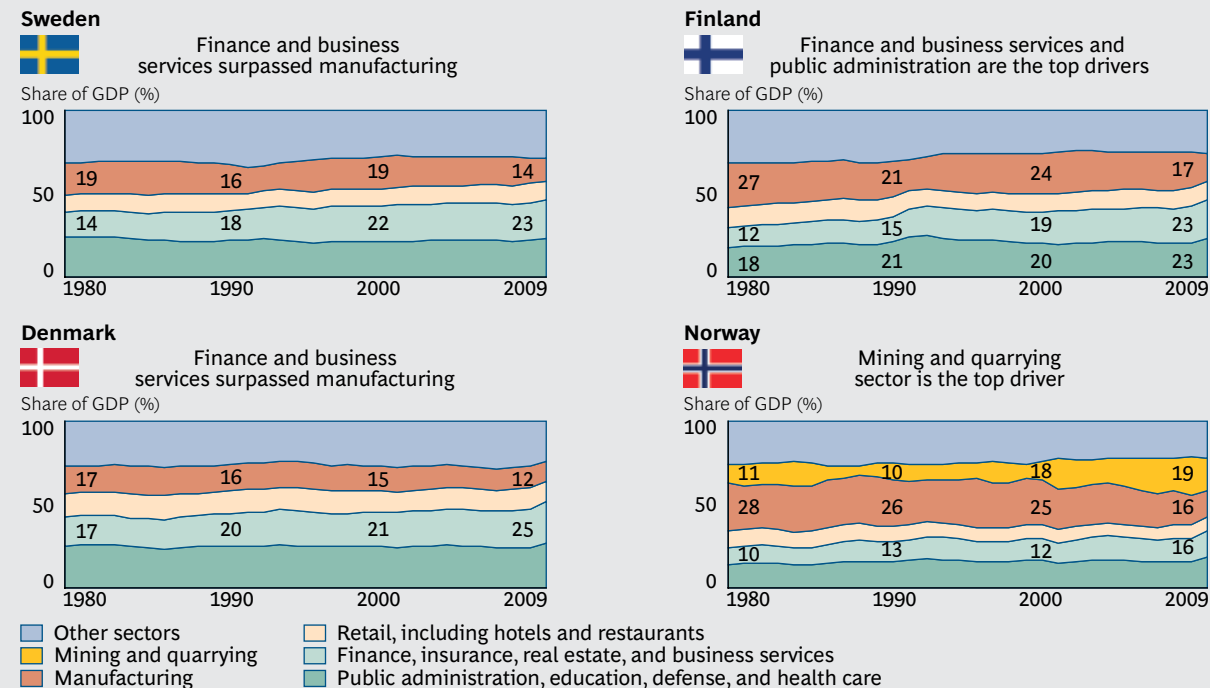


Sources: OECD; International Labour Organization, LABORSTA database.

Note: Combined data from OECD and LABORSTA were used to show the development of manufacturing jobs. Total employment was modeled using OECD data.

¹All figures for numbers of jobs lost per country are approximate.

EXHIBIT 4 | Manufacturing's Share of GDP Has Shrunk to Around 15 Percent Since 1980 Across the Nordic Region



Source: OECD.

240,000. Job losses have been accelerating for more than a decade. (See Exhibit 3.)

Manufacturing’s share of Nordic GDP from 1980 to 2010 shrank from around 20 to 25 percent to about 15 percent. (See Exhibit 4.) Financial and business services, by contrast, now account for the biggest share of GDP in Denmark, Finland, and Sweden, rising from 12 to 17 percent in 1980 to nearly 25 percent. Norway, of course, is an exception to this trend.

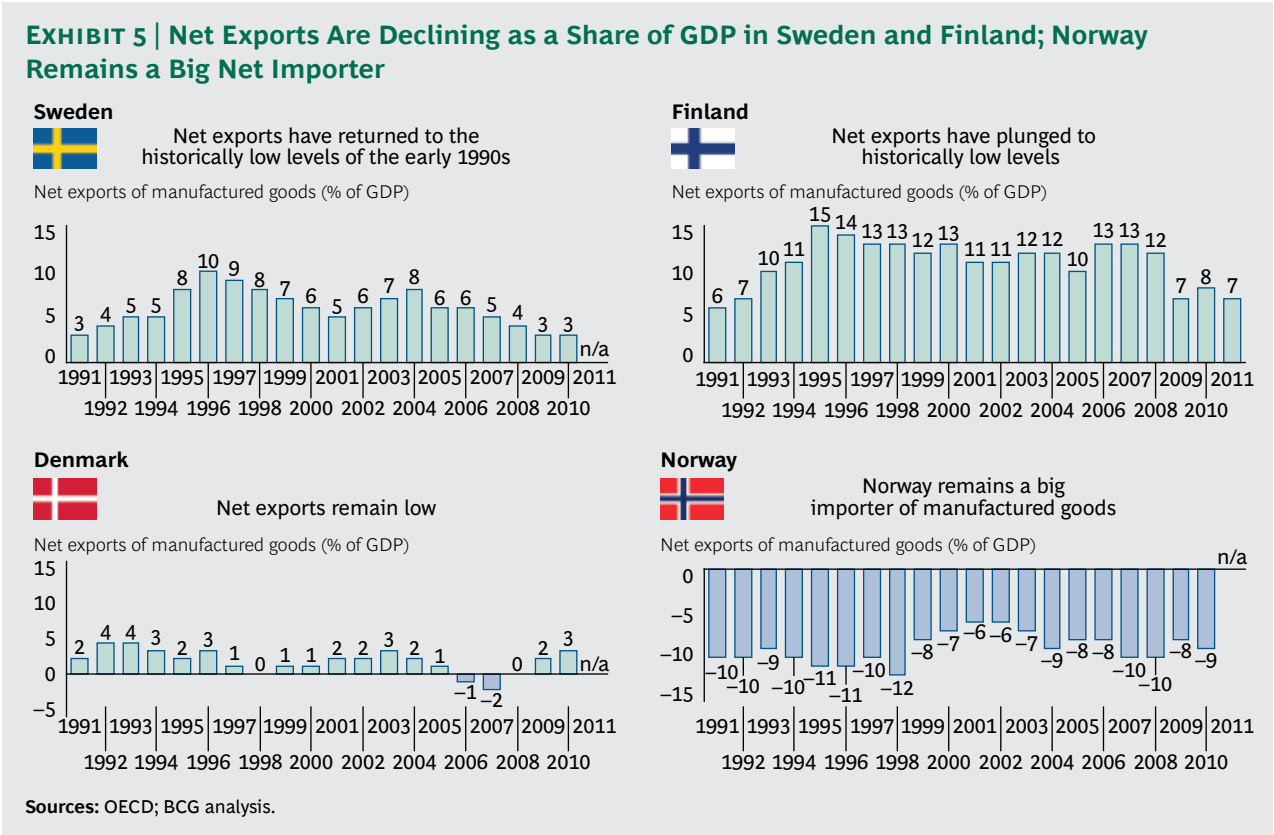
Nordic trade statistics also reflect the migration of manufacturing. In the mid-1990s, Sweden enjoyed annual trade surpluses in manufactured goods of 8 to 10 percent. In Finland, annual surpluses of 11 to 15 percent were common two decades ago. But these surpluses have shrunk steadily and are now near historic lows. (See Exhibit 5.) Norway is a large net importer, as it has been for three decades, while Denmark now has roughly balanced trade in manufactured goods.

Nordic manufacturing output has continued to grow nonetheless, primarily because of investments in automation and the shift toward

technology- and knowledge-intensive sectors. Industries such as basic metals, petrochemicals, and wood products, which rely on domestic natural resources, have continued to be significant employers, although profits have been falling in sectors outside of the oil-and-gas industry.

Job losses have been harsh in labor-intensive industries, however. Lured by average manufacturing wages in Eastern Europe and China that remain around 80 to 90 percent lower than in the Nordic economies, producers of such goods as furniture, textiles, and electrical components have shifted much of their employment to emerging markets.

Nordic employment in these industries has been contracting by around 3 to 5 percent annually for the past decade. In 2000, for example, Swedish computing and electrical-component manufacturers employed virtually all of their workers domestically. A decade later, 22 percent of their employees were in low-cost countries. This change was in addition to the large numbers of workers employed offshore by contract manufacturers. Among textile and apparel companies, the share of employ-



ment in low-cost countries rose from 8 percent to 42 percent.

Growing demand in emerging markets has also driven offshoring. Large Nordic companies have been adjusting their global footprints to succeed in the “two-speed world.” They are building new capacity in fast-growing emerging markets to be closer to their customers.

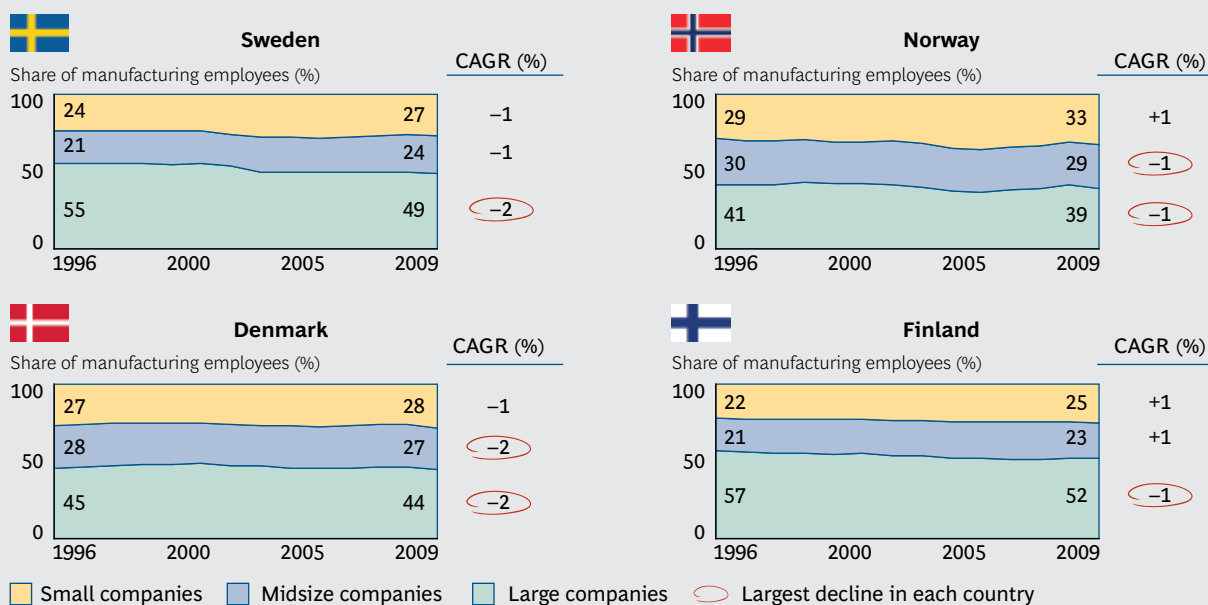
Large Nordic companies are building new capacity in fast-growing emerging markets.

Production aimed at the more mature markets of Europe, meanwhile, has been shifting to Eastern Europe. Nordic producers of machinery, motor vehicles, and electronics now employ about one-quarter of their workforces in low-cost countries. Workers in these countries accounted for 15 percent of the labor force of Swedish machinery and equipment companies from 1998 to 2000; they accounted for 34 percent from 2008 to 2010.

There have been several high-profile offshore moves to low-cost countries in the past few years. Industrial group Danfoss announced layoffs of hundreds of workers in both Denmark and Finland in 2009 and 2010 as a result of its plan to relocate part of production to Slovenia and Poland. Nokia has cut thousands of jobs in Finland in the past few years while both downsizing and shifting the assembly of its smartphones to Asia. In Sweden, medical technology company Getinge Group announced in 2012 that it was moving production jobs to China, while Volvo Buses and confectionary company Cloetta announced that they were moving production jobs to Eastern Europe. Swedish garden-equipment maker Husqvarna began relocating part of its manufacturing to Poland and China in 2010. ABB’s robotics division moved production from Norway to China in 2009, and in that same year storage-solutions company Constructor shut a Norwegian plant and consolidated production in Germany.

There is cause for optimism, however. So far, large established companies have mainly led the offshore push. Small and midsize companies, for which regional offshoring makes less sense in part because of the high investment

EXHIBIT 6 | The Decline in Nordic Manufacturing Employment Has Been Driven by Large Companies



Source: Eurostat.

Note: Company size was defined as follows: small companies had fewer than 50 employees; midsize had 50-249 employees; and large had at least 250 employees.

cost, have been slower to shift production outside of the Nordic area.

While manufacturing employment by large companies has been declining by 1 to 2 percent annually since the mid-1990s, employment by companies with 249 workers or less has remained stable. As a result, 51 percent of Sweden's manufacturing workforce is employed by small and midsize companies, compared with 45 percent in 1996. (See Exhibit 6.) In Finland, the share of smaller-company employment rose from 43 percent to 48 percent over that period.

If Nordic economies become more competitive as a base for high-skilled, knowledge-intensive manufacturing, today's small companies could grow into the large industrial employers of tomorrow. Because small and midsize companies are able to maintain a strong Nordic manufacturing sector, it is imperative that they get the support they need to grow.

THE CHALLENGING ROAD AHEAD

THE PATH FOR NORDIC manufacturing doesn't get easier. Denmark, Finland, Norway, and Sweden all face strong headwinds that undermine their competitiveness. Some of these challenges stem from structural changes in the global economy and demographic shifts that are beyond the control of government and business leaders. But others can be addressed through policy reforms. The key challenges are operating in a two-speed world, workforce constraints, eroding cost competitiveness, growing volatility, deteriorating industrial health, and a lack of new manufacturers.

The Two-Speed World

The shift of global consumption growth from the developed to the developing world is profoundly influencing company decisions on where to locate manufacturing. From 1995 to 2005, Chinese consumption of manufactured goods rocketed from around \$1 trillion annually to \$3.3 trillion, and China's share of global manufactured goods consumption rose from 6 percent to 14 percent. Consumption in the Nordic economies remained essentially flat, at around \$500 billion. Annual consumption also barely changed in Germany, and it declined in Japan. (See Exhibit 7.)

A striking divergence in opportunity also exists among Western economies: consumption in the United States, the world's biggest mar-

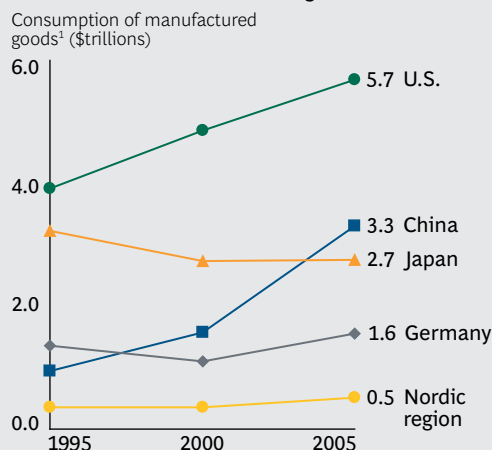
ket, has dramatically outpaced that of Western Europe—and the Nordic region in particular. From 1995 to 2005, annual U.S. consumption of manufactured goods soared from \$4 trillion to \$5.7 trillion.

In the foreseeable future, the biggest opportunities for many Nordic companies will continue to be abroad.

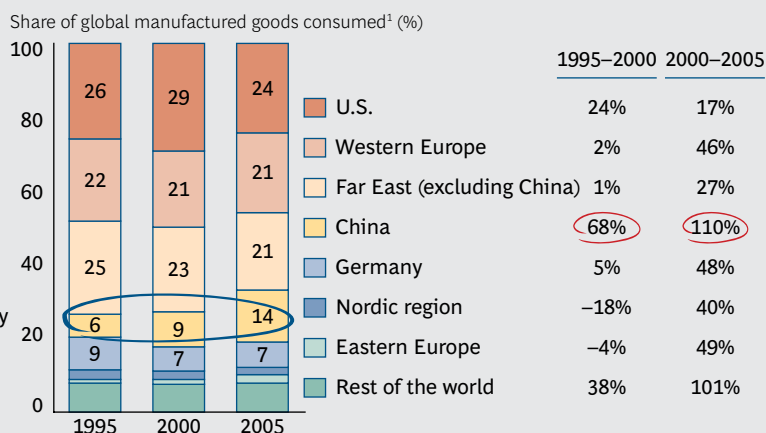
In the foreseeable future, the biggest opportunities for many Nordic companies will continue to be abroad. Growth in Europe, which now accounts for the bulk of their revenues, is likely to stagnate. As a result, domestic markets and Europe will account for a declining share of sales by Nordic companies across every industry. This will force Nordic manufacturers to try to sell more of their products outside Europe. We project that around 68 percent of sales of petroleum and chemical products from Finnish companies in 2020 will be within Europe and the Nordic region, compared with 76 percent in 2008, for example. The share of transportation equipment from Danish companies sold within the region is projected to drop from 64 percent in 2008 to 57 percent in 2020. (See Exhibit 8.)

EXHIBIT 7 | The Growth in Demand for Manufactured Goods Has Moved East

The U.S. remains the biggest customer for manufactured goods...



...but demand is growing faster in China

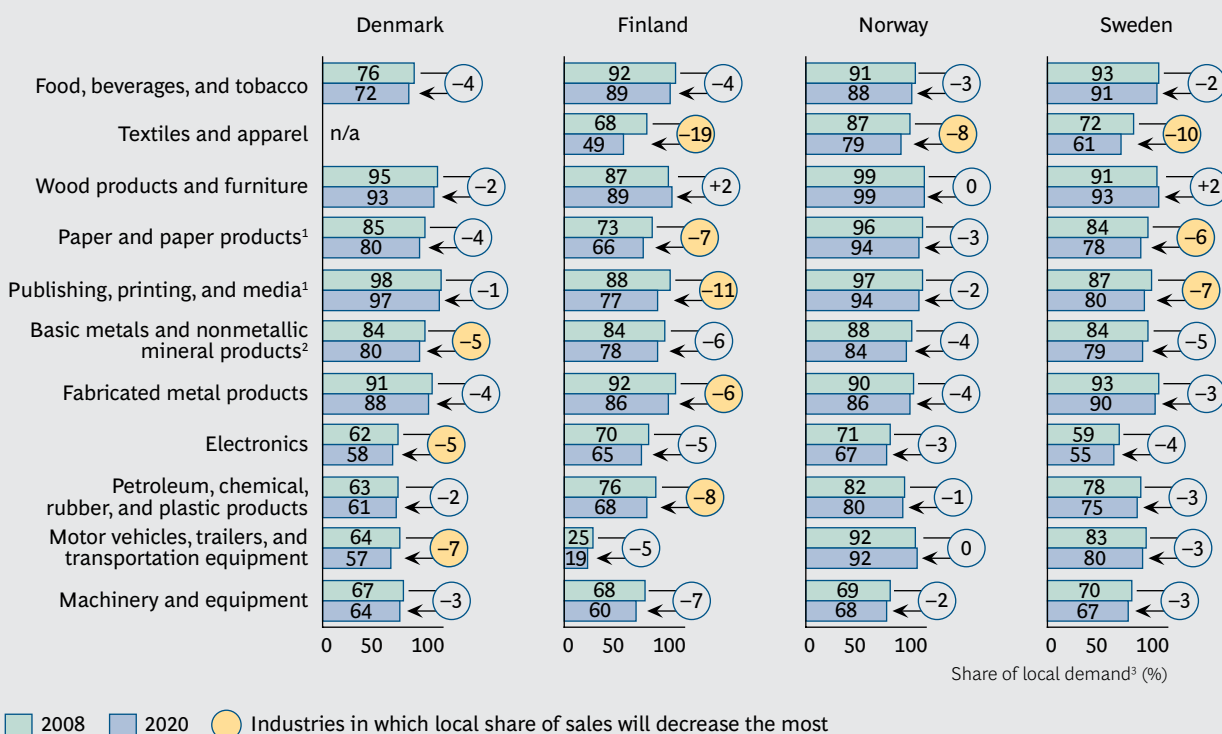


Sources: OECD; BCG analysis.

Note: Total world demand for manufactured goods includes OECD countries and Argentina, Brazil, Bulgaria, China, Taipei, Cyprus, India, Indonesia, Latvia, Lithuania, Malta, Romania, Russia, South Africa, Thailand, and Vietnam.

¹The consumption of manufactured goods is defined as production (as determined by the value of final and intermediate goods) plus imports minus exports.

EXHIBIT 8 | The Demand for Manufactured Goods in the Nordic Region and Europe Is Expected to Continue to Decline



Sources: OECD; World Input-Output Database; BCG analysis.

Note: The calculation of global demand trends was based on the 2008 split of sales of Nordic production by destination country and the 1995–2009 CAGR of manufactured-goods consumption for all countries.

¹The growth rates for paper and paper products, as well as publishing, printing and media, are based on the aggregate growth of those industries.

²The growth rates for basic metals and nonmetallic mineral products and fabricated metal products are based on the growth rates for basic metals and fabricated metal products.

³The share of local demand is defined as the domestic, Nordic, and Western European share of destinations for gross output.

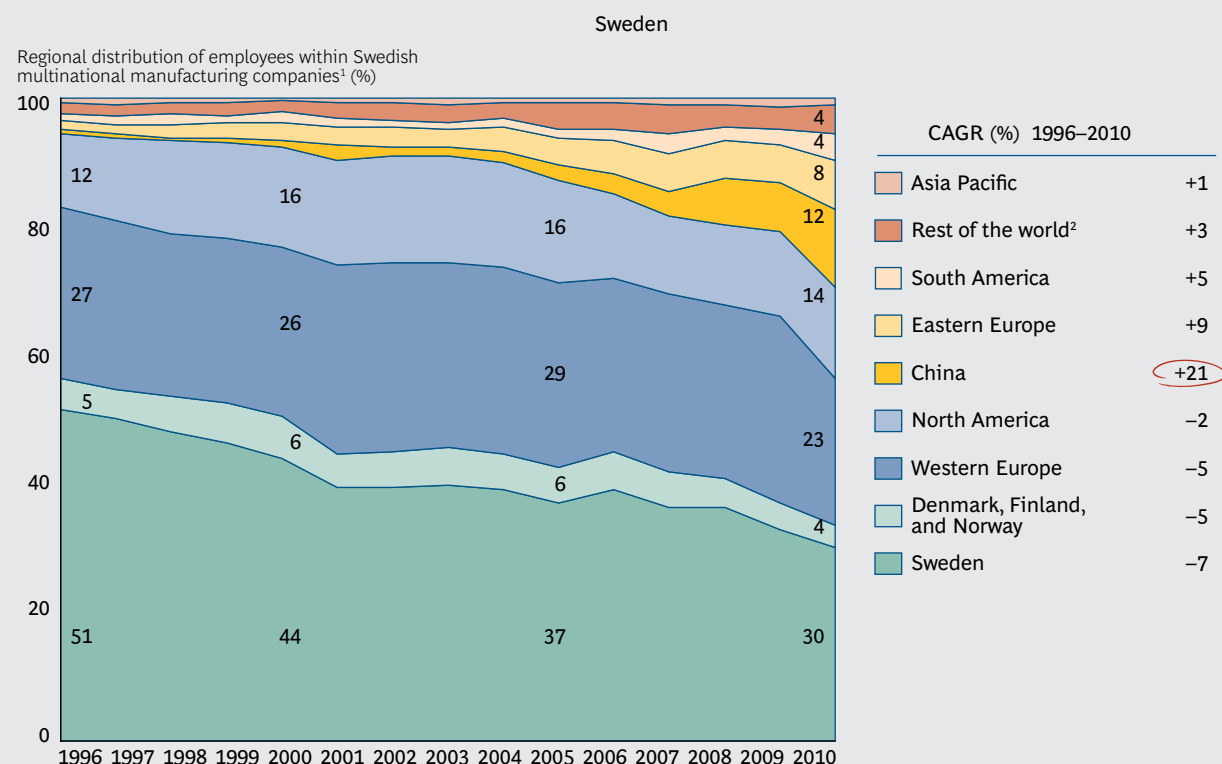
Especially for large, globally minded Nordic companies, these economic realities translate into powerful incentives to locate new capacity offshore. In 1996, more than half the employees of Swedish manufacturing companies were based in Sweden; only 4 percent were based in China, Eastern Europe, South America, and the Asia-Pacific region *combined*. Today, only 30 percent of these employees live in Sweden. Around 28 percent live in emerging markets, with China alone accounting for 12 percent of employment by Swedish manufacturers. (See Exhibit 9.)

Investment data confirm this trend. From 2000 to 2006, 81 percent of capital expenditure by Finnish manufacturing companies was invested within the Nordic region. From 2007 to 2011, that dropped to 67 percent. The biggest winners from Finnish capital investment have been the rest of Western Europe and developing economies, including Russia, Eastern Europe, and South America.

Nordic companies are likely to accelerate their search for offshore growth as the economic paths of their domestic markets and the emerging markets continue to diverge. Small and midsize Nordic companies are still behind the curve when it comes to capitalizing on global opportunities. Almost two-thirds of revenues for small and midsize Swedish companies come from the Nordic region and Western Europe. Large companies based in all four Nordic countries have derived only 2 to 3 percent of their sales from transactions in China, even though China accounted for 22 percent of global demand as of 2009. As Nordic manufacturers better align their sales with global demand, pressure to relocate manufacturing will likely mount.

The multinational-company executives we interviewed said that while their first offshore moves were painful, most of their low-cost factories now boast quality and productivity levels that are comparable with those at their Nordic plants. As Nordic companies continue

EXHIBIT 9 | In Sweden, Companies Have Moved Production Jobs to Emerging Markets with Higher Demand Growth



to establish manufacturing bases in China and other emerging markets, it becomes easier to move larger shares of production and even R&D.

Workforce Constraints

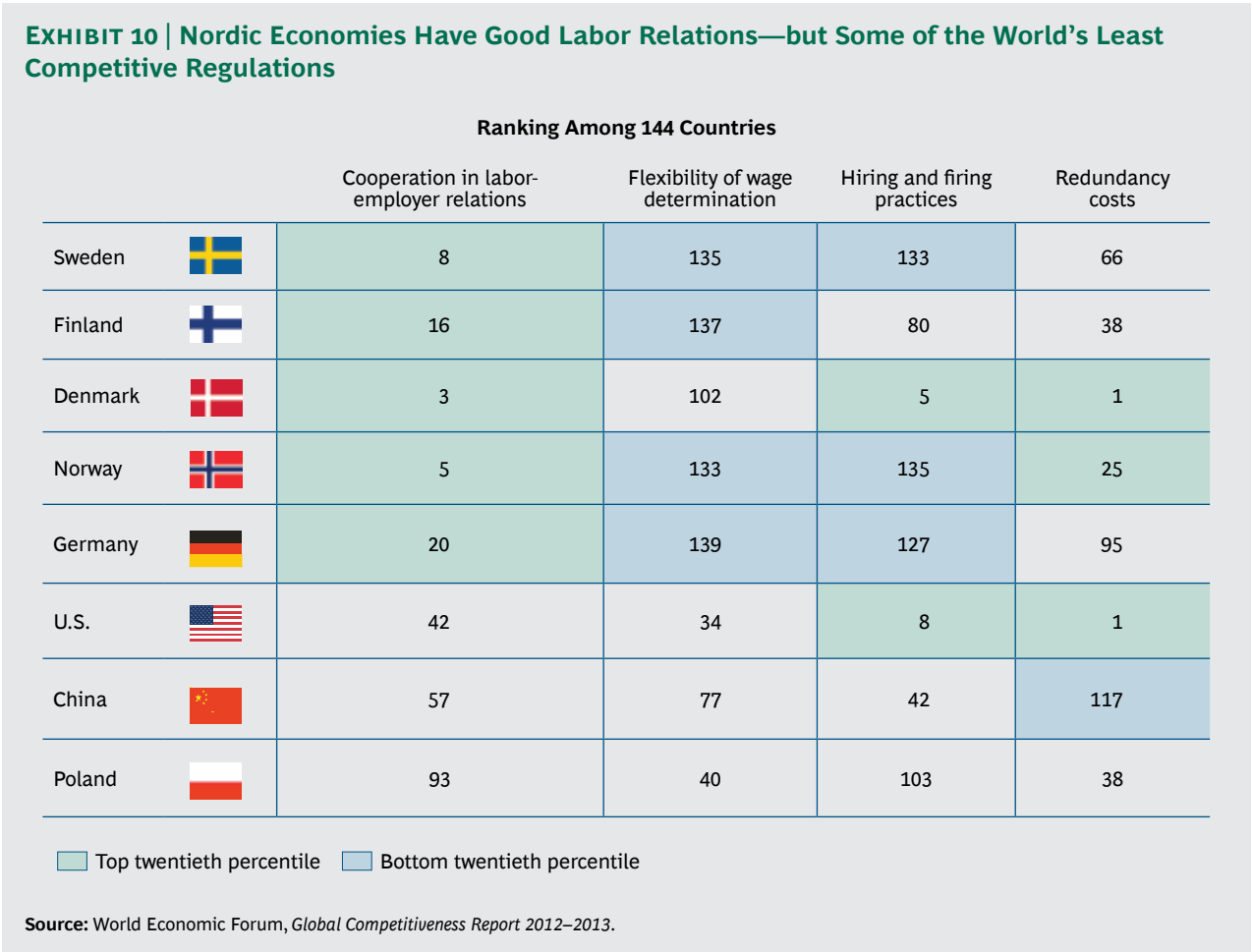
Nordic manufacturers must cope with some of the industrialized world’s most rigid labor policies and regulations. According to the World Economic Forum’s *Global Competitiveness Report 2012–2013*, Sweden, Norway, and Finland are among the countries that rank in the bottom twentieth percentile of 144 countries in terms of flexibility in setting wages. That is much lower than the U.S., China, and some Eastern European countries, such as Poland. Sweden and Norway also rank in the bottom twentieth percentile in hiring and firing practices, while Finland ranks in the middle. (See Exhibit 10.)

This environment is especially difficult for small and midsize Nordic companies. Rigid

labor laws make adding full-time employees risky and costly for companies, especially in industries for which demand is hard to predict. This constitutes a growth impediment for smaller enterprises, and it will likely limit their ability to compensate for offshoring by large companies. Denmark, which has a highly flexible workforce, is the only Nordic exception. The Global Competitiveness Index 2012–2013 ranks Denmark fifth in hiring and firing practices, third in terms of cooperative labor-employer relations, and first in redundancy costs.

There is hope for the other Nordic countries, which share a strong culture of collaboration between companies and unions. All four Nordic countries ranked in the top twentieth percentile for cooperation in labor-employer relations.

Inflexible labor regulations, combined with factory downsizings, have also effectively excluded Nordic youth from industrial employ-



ment. Partly as a consequence, the manufacturing workforce has aged significantly. The share of employees under the age of 30 is at its lowest point since World War II. In Sweden, for example, the portion of manufacturing workers age 29 and under has dropped from 42 percent to 31 percent since 1985. (See Exhibit 11.) Not surprisingly, unemployment among Swedes ages 18 to 29 has risen from below 5 percent to above 15 percent over the past decade, despite Sweden’s recovery from the 1990s crisis. If current trends continue, less than 20 percent of Swedish manufacturing employees will be younger than 30 by 2020.

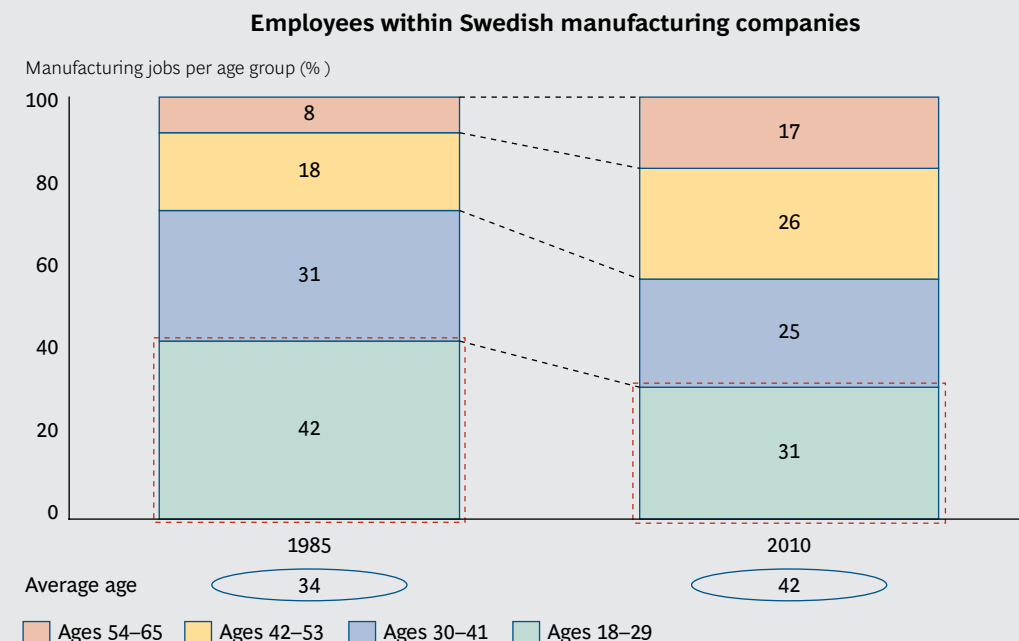
The picture is similar in Denmark, despite its relatively flexible workforce: the average age of manufacturing workers has risen from 37 to 43 since 1993. Only 9 percent of Denmark’s industrial workforce is under the age of 24, down from 21 percent in 1993. This is not due to a lack of young people available for work: unemployment among youth has remained at 14 percent for the past two years, compared with around 8 percent through much of the previous decade. On top of this, overall manufacturing employment in Denmark has plunged by around 30 percent—shrinking job opportunities even further.

Such declines threaten Nordic industry because the availability of highly trained factory workers has long been a key competitive advantage. The effective exclusion of today’s youth from manufacturing jobs will exacerbate the competitive challenge over the next two decades as highly trained workers retire, with few successors rising through the ranks. There is a risk of a future shortage of trained workers.

Bleak prospects for youth employment have serious implications for Nordic economies.

Bleak prospects for youth employment also have serious implications for Nordic economies. The aging of the region’s population already means that fewer working-age citizens will be available to provide for seniors and children. In Finland, for example, the share of the population that is of working age—between 15 and 64—is expected to drop from 67 percent in 2010 to 57 percent in 2030. This means that Finland’s

EXHIBIT 11 | Sweden Illustrates the Significant Aging of Nordic Workforces



Source: Confederation of Swedish Enterprise.

dependency ratio will be roughly similar to that projected for Japan.

Eroding Cost Competitiveness

With wages in China and other emerging markets rising sharply each year, one might think that the cost advantages of offshore manufacturing are dissipating. Indeed, after rising 11 percent per year for the past decade, average fully loaded wages in China are projected to climb 13 percent annually through 2020. In Asia as a whole, wages are projected to rise at least twice as fast as in the Nordic countries for the rest of the decade.

Nevertheless, the labor-cost gap is not shrinking sufficiently to improve Nordic manufacturing competitiveness compared with low-cost countries in the near term. This is in sharp contrast to the position of the United States, whose manufacturing competitiveness is improving as wages and other costs rise in China. After fully accounting for differences in worker productivity, logistics, and the many risks and costs associated with operating extended global supply chains, BCG has projected that within a few years it will make economic sense for more goods consumed in the U.S. to be manufactured in the U.S. rather

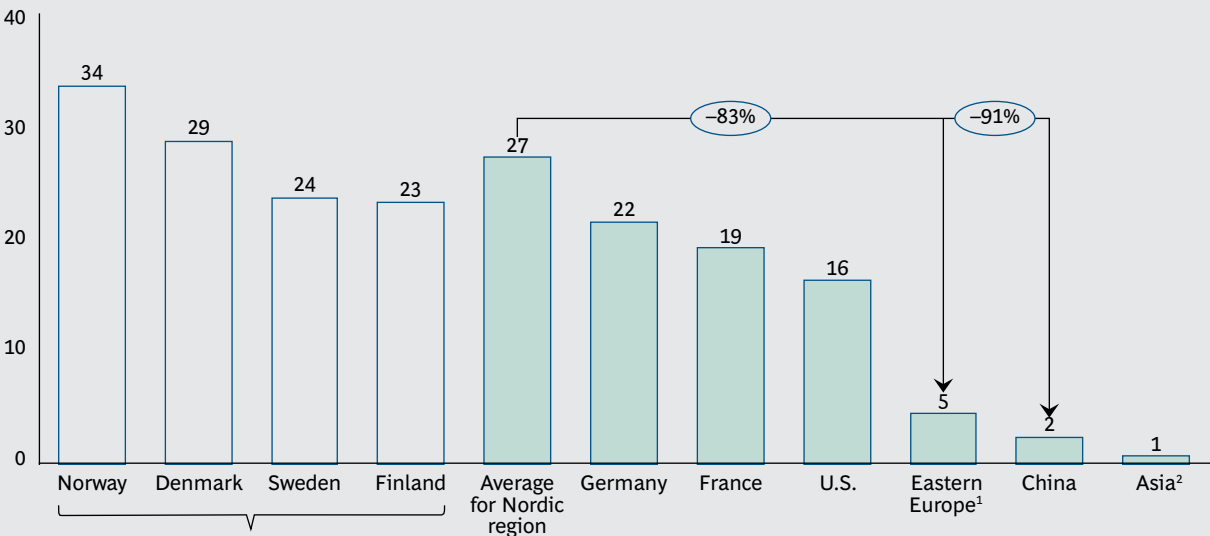
than in China. This is why BCG predicts that several million jobs could be created in the U.S. as a result of reshored manufacturing and higher exports. (See *Made in America, Again: Why Manufacturing Will Return to the U.S.*, BCG Focus, August 2011, and *U.S. Manufacturing Nears the Tipping Point: Which Industries, Why, and How Much?*, BCG Focus, March 2012.)

The difference is that Nordic wages start from a much higher base. In 2011, the average cost for a manufacturing worker in Denmark, Finland, or Sweden—including benefits—was €27 per hour; it was €34 per hour in Norway. That compares with €22 in Germany, €19 in France, and the equivalent of €16 in the U.S. At an average of just €5 per hour, Eastern Europe’s fully loaded labor cost is 83 percent lower. Chinese labor, at around €2 per hour, is 91 percent cheaper. (See Exhibit 12.)

What’s more, Nordic wages continue to rise sharply. Since 2004, average Norwegian hourly factory wages (in U.S. dollars) have increased 6.4 percent annually. They have risen by 3.5 percent per year in Denmark, 3.7 percent in Finland, and 4.6 percent in Sweden. In Germany and the U.S., by contrast, average production wages rose only 2.0 and 2.6 percent,

EXHIBIT 12 | Manufacturing Labor Costs in Emerging Markets Are 83 to 91 Percent Lower Than in the Nordic Region

Average fully loaded manufacturing salary, 2011 (€ per hour)



Sources: Economist Intelligence Unit; U.S. Bureau of Labor Statistics; BCG analysis.

¹Refers only to the Czech Republic, Hungary, Romania, and Slovakia.

²Refers only to India, the Philippines, and Thailand.

respectively, per year over the same period. (See Exhibit 13.) To put this in perspective, the factor cost of a Swedish manufacturing worker rose by 43 percent since 2004, compared with just 17 percent for a German worker.

Wages in all four Nordic economies will likely rise through 2020.

We expect that wages in all four Nordic economies will continue to rise by 2 to 3 percent annually through 2020. Even though this is far below the pace of wage inflation in China and other emerging markets, Nordic wages are rising just as fast in absolute terms because they are starting from a dramatically higher base. By 2020, we project that average fully loaded factory wages will increase from the current rate of about €29 per hour to €36 per hour in Denmark and from around €23 to €30 per hour in Finland. The wage-cost gap between Nordic economies and emerging markets, therefore, is unlikely to shrink

enough to make the region's manufacturers more competitive in the near term. Indeed, the wage gap with Eastern Europe is projected to widen dramatically. (See Exhibit 14.) The cost gap between the Nordic economies on the one hand and Germany and the U.S. on the other is also expected to widen through the rest of the decade.

Growing Volatility

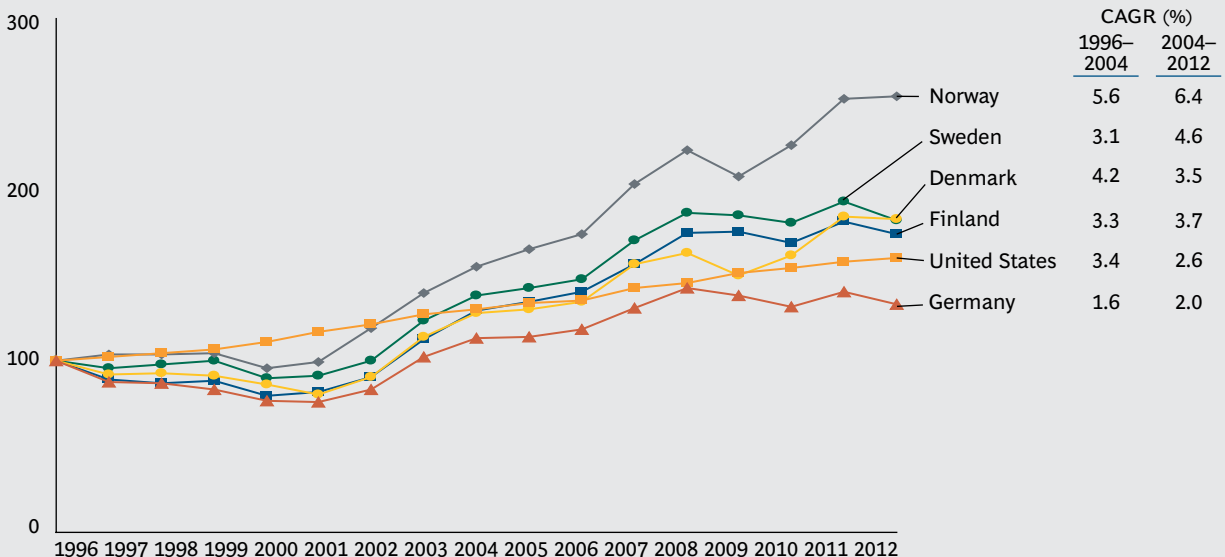
Volatility has risen as a consequence of the 2008 global financial crisis, causing wild swings in demand. Industrial orders in Sweden decreased by around 20 percent in 2009 and then rose by around 15 percent the following year before tumbling again. In Finland and Denmark, postcrisis monthly fluctuations in the volume of industrial orders have been twice as great as between 2000 and 2008.

Deteriorating Industrial Health

Competitive pressures and overcapacity are taking their toll on Nordic industry's financial health. As a result, job losses continue to mount. In Finland, major employers are in poor financial health. From 2005 through

EXHIBIT 13 | The Relative Competitiveness of the Nordic Region Compared with the U.S. and Germany Has Worsened

Fully loaded hourly wages \$ (indexed, 1996=100)



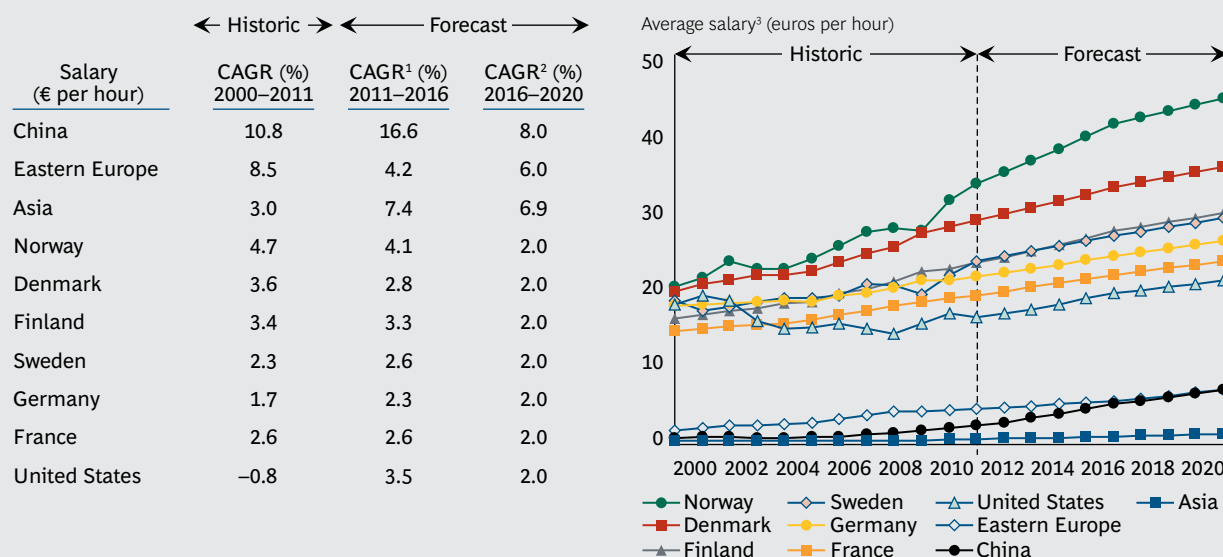
Source: Economist Intelligence Unit.

Note: German labor reforms occurred during 2000s. The data reflect the average hourly compensation costs for all employees in manufacturing. Those costs include direct pay, bonuses, health care and other social benefits, and labor-related taxes and subsidies.

EXHIBIT 14 | The Wage Gap Is Unlikely to Shrink Enough to Make Nordic Manufacturers Competitive by 2020

Wage growth in low-wage countries is expected to be two to three times faster than in the Nordic region...

...but the gap will still be substantial in 2020 if development follows projections



Sources: Economist Intelligence Unit; U.S. Bureau of Labor Statistics; BCG analysis.

¹Based on a forecast by the Economist Intelligence Unit.

²Based on BCG analysis.

³Data for the average salary include the currency effect.

2010, returns on capital employed (ROCE) averaged 2 percent for paper manufacturers and 8 percent for wood product manufacturers. The cost of capital for these two sectors during the same period stood at 8 percent and 11 percent, respectively. Even more troublesome is that Finland's two largest steel companies had negative ROCE in 2011.

In Denmark, ROCE for the following industries is below their cost of capital: basic metal, publishing, transportation equipment, and paper products. While most industries in Sweden are in strong financial health, with ROCE above their cost of capital, exports are at serious risk if the Swedish currency remains at its present level of around 6.50 krona to the dollar. In Norway, the strong oil-and-gas sector is indirectly creating financial challenges for other industries by driving up the costs of labor and capital.

One disturbing trend is that even Nordic industries in relatively stable condition are shedding workers. Out of the top five industries in Denmark, for example, only three—machinery, food and beverages, and petroleum and chemical products—are in

decent shape, generating ROCE above their cost of capital in the past five years. Since 2000, Denmark's machinery industry has cut its workforce by 24 percent, and the food and beverages industry has cut its workforce by 26 percent.

Two other key industries—fabricated metals and electrical components—are in relatively strong financial shape. Yet they have also reduced employment, by 25 percent and 27 percent, respectively.

These five industrial sectors, which account for 68 percent of Denmark's manufacturing employment and 78 percent of manufacturing's contribution to GDP, have lost a combined 65,000 workers since 2000. Danish media have quoted top executives from such companies as industrial group Danfoss and medical-supply maker Coloplast, warning of even steeper job losses if the competitive environment doesn't improve.

Global overcapacity in many of these industries increases the pressure to downsize still further in the Nordic region. Prior to the global financial crisis, emerging markets experi-

enced heavy investment in modern plants. When companies reduce output, they are likely to do so in Europe and use capacity in lower-cost economies instead.

Lack of New Manufacturers

The region's manufacturing sector is dominated by companies established decades ago in old-line industries. There have been very few major new entrants. For instance, 24 of Denmark's 30 biggest manufacturing companies, and 28 of those in Norway, were founded before 1972. In Sweden, 27 of the top 30 were founded before 1962, and only 11 percent of Sweden's manufacturing employees work at companies that were founded after that year.¹ In fact, 119 of the top 120 manufacturing companies in all four Nordic economies were incorporated in 2002 or earlier. This suggests that Nordic nations are not developing enough dynamic new manufacturers capable of becoming global leaders in next-generation industries.

What's at Risk: Projecting Job Losses

The impact on Nordic industrial employment and economic health will be grave if little is done to improve the region's competitive environment for manufacturing. According to our baseline projection, Denmark, Finland, Norway, and Sweden will lose some 205,000 manufacturing jobs by 2020. Manufacturing job losses will be substantially less if Europe's financial system stabilizes, if Nordic currencies do not appreciate against those of major trading partners, and if there is negligible impact from new EU directives on sulfur content in shipping fuels. But new Eurozone crises, sharp currency appreciation, and a significant adverse impact from the sulfur directive would lead to considerably higher losses.

Denmark. We project that around 64,000 of the country's 344,000 manufacturing jobs will be lost by 2020 in our baseline scenario. These account for almost 19 percent of total manufacturing jobs. The pace of job reductions—2.2 percent annually—is likely to be slower than during the previous decade. But it follows a period of massive layoffs since 2005, especially

in industries such as food and beverages, machinery, fabricated metals, and wood products. (See Exhibit 15.)

Nordic nations are not developing enough dynamic new manufacturers.

Denmark's food and beverages industry, which now employs 64,000 people, is likely to cut 14,000 domestic workers, and the machinery and equipment, as well as the wood products, industries will each cut about 11,000. The publishing and printing, transportation equipment, and wood products industries are expected to see the steepest reductions, respectively averaging 5.3 percent, 4.4 percent, and 4.0 percent annually through the rest of the decade. The manufacturing jobs outlook could worsen considerably if Denmark's cost position versus Sweden and Germany erodes further. Because Denmark's competitiveness in renewable energy is weak, further jobs would be at risk if industrial-energy costs spike due to the country's plan to eliminate fossil fuel use by 2050.

Finland. According to our baseline scenario, Finland will lose another 42,000 of its current 366,000 manufacturing jobs by 2020, or around 11 percent of the current total. The pace of decline, which was 2.8 percent annually from 2005 to 2011, will drop to 1.3 percent through the end of the decade. We see employment stabilizing or declining slightly in our baseline forecast for several Finnish industries, such as fabricated metals and machinery and equipment. But manufacturers of electronics, transportation equipment, and petroleum and chemical products are likely to keep reducing their workforces by around 2 to 3 percent annually. In the paper products industry, layoffs will be even more serious—averaging 3.6 percent of its manufacturing labor force annually. (See Exhibit 16.)

Whether these forecasts are optimistic or pessimistic will depend largely on whether Russia becomes an export destination for Finnish machinery, chemicals, and textiles now that

EXHIBIT 15 | Denmark Is Projected to Lose About 64,000 Manufacturing Jobs by 2020

Key industries	Number of jobs, 2011 (thousands)	Jobs CAGR (%) 2000–2005	Jobs CAGR (%) 2005–2011	Projected jobs CAGR (%) 2011–2020	Projected job losses, 2011–2020 (thousands)
Food, beverages, and tobacco	64	–2.0	–3.4	–2.7 ^a	–14
Machinery and equipment	55	–1.1	–3.6	–2.5 ^a	–11
Petroleum, chemical, rubber, and plastic products	51	0.7	–0.1	0.3 ^a	1
Electronics	39	–4.0	–1.7	–1.7 ^b	–9
Fabricated metal products	36	–2.2	–2.9	–2.6 ^a	–8
Wood products and furniture	25	–4.0	–8.4	–4.0 ^c	–11
Publishing, printing, and media	24	–4.6	–5.8	–5.3 ^a	–9
Basic metals and nonmetallic mineral products	24	–6.2	2.8	–1.4 ^a	–3
Textiles and apparel	12	–8.1	2.0	–2.7 ^a	–3
Motor vehicles, trailers, and transportation equipment	10	–0.2	–7.8	–4.4 ^a	–3
Paper and paper products	5	3.8	–7.2	–2.3 ^a	–1
Total	344	–2.7	–3.1	–2.2^d	–64^d

Sources: OECD; BCG analysis.

Note: The 2020 gains and losses in manufacturing jobs were calculated by extrapolating and adjusting the number of jobs after 2011, based on the growth rate from 2000 to 2011.

^aExtrapolated from the growth rates for 2000–2011.

^bExtrapolated from the growth rates for 2005–2011.

^cExtrapolated from the growth rates for 2000–2005.

^dThis total represents the sum of individual industries.

EXHIBIT 16 | Finland Is Projected to Lose About 42,000 Manufacturing Jobs by 2020

Key industries	Number of jobs, 2011 (thousands)	Jobs, CAGR (%) 2000–2005	Jobs, CAGR (%) 2005–2011	Projected jobs CAGR (%) 2011–2020	Projected job losses, 2011–2020 (thousands)
Machinery and equipment	62	0.6	–0.8	–0.2 ^a	–1
Electronics	52	–1.8	–4.0	–1.8 ^b	–8
Fabricated metal products	41	2.5	–2.1	0.0 ^a	0
Food, beverages, and tobacco	40	–1.7	0.1	–0.5 ^c	–2
Basic metals and nonmetallic mineral products	33	–0.5	–0.7	–0.6 ^a	–2
Petroleum, chemical, rubber, and plastic products	33	–2.2	–2.9	–2.6 ^a	–7
Wood products and furniture	31	–1.6	–5.8	–1.6 ^b	–4
Paper and paper products	24	–3.6	–5.3	–3.6 ^b	–7
Publishing, printing, and media	22	–2.1	–5.3	–2.1 ^b	–4
Motor vehicles, trailers, and transportation equipment	18	–3.6	–3.0	–3.3	–5
Textiles and apparel	9	–4.3	–5.4	–4.9	–3
Total	366	–1.3	–2.8	–1.3^d	–42^d

Sources: OECD; BCG analysis.

Note: The 2020 gains and losses in manufacturing jobs were calculated by extrapolating and adjusting the number of jobs after 2011, based on the growth rate from 2000 to 2011.

^aExtrapolated from the growth rates for 2000–2011.

^bExtrapolated from the growth rates for 2000–2005. The large layoffs during the recession toward the end of the first decade of the 2000s are not expected to continue. The growth rate is expected to revert to that of the early part of the first decade of the 2000s.

^cExtrapolated and adjusted from the weighted average of 35 percent growth rate of 2005–2011 and the 65 percent growth rate of 2005–2011. The recent tax increase is expected to hurt growth.

^dThis total represents the sum of individual industries.

the nation has joined the World Trade Organization. Finland’s ability to maintain its current energy-cost advantage will also heavily influence employment, especially in key industries such as basic metals, chemicals, paper, and wood products.

Norway. Because Norwegian industries do not depend as heavily on exports as the other Nordic economies do, the magnitude of manufacturing job losses is likely to be less severe—but still significant. We project that Norway will lose 24,000 of its current 252,000 manufacturing jobs by 2020 in our baseline scenario, or around 10 percent of the current total. Also, the pace of reductions will rise somewhat, from an average of 0.8 percent per year from 2005 to 2011 to 1.2 percent annually for the rest of this decade.

We project that the paper products industry will lose 40 percent of manufacturing jobs, or around 2,000 positions, by 2020. The wood products and furniture industry will lose about 5,000 in our baseline projection, or about 25 percent of its current domestic workforce. (See Exhibit 17.) Job losses could

be greater if Norway loses its energy-cost advantage because of harmonization with EU energy markets, and if its labor-cost gap with Sweden widens.

Sweden. By 2020, our baseline scenario projects, Sweden will lose another 75,000 manufacturing jobs—around 12 percent of its current industrial workforce of 634,000. The pace of layoffs will accelerate slightly, from an average 1.3 percent from 2005 to 2011 to 1.4 percent per year from 2011 through 2020. (See Exhibit 18.) Job losses will remain steady in sectors that have already experienced considerable offshoring during the previous decade, such as electronics and apparel. The pace will accelerate in the machinery and equipment sector, which will shed 1.3 percent of its production jobs, or some 9,000 jobs, each year through the rest of this decade. The food and beverages industry stands to lose another 11,000 jobs by 2020, an annual average reduction of 2.3 percent, compared with 1.5 percent during the previous five years. Job losses will likely accelerate in the following industries: fabricated metals, wood products, and publishing and printing.

EXHIBIT 17 | Norway Is Projected to Lose About 24,000 Manufacturing Jobs by 2020

Key industries	Number of jobs, 2011 (thousands)	Jobs CAGR (%) 2000–2005	Jobs CAGR (%) 2005–2011	Projected jobs CAGR (%) 2011–2020 ^a	Projected job losses, 2011–2020 (thousands)
Food, beverages, and tobacco	49	–2.0	–0.2	–1.0	–4
Motor vehicles, trailers, and transportation equipment	37	–0.6	0.4	–0.1	0
Machinery and equipment	28	–2.8	5.1	1.4	4
Publishing, printing, and media	27	–0.7	–3.3	–2.1	–5
Electronics	22	–3.7	0.9	–1.2	–2
Basic metals and nonmetallic mineral products	21	–4.1	–0.9	–2.4	–4
Wood products and furniture	21	–3.0	–3.2	–3.1	–5
Fabricated metal products	20	–0.1	0.9	0.4	1
Petroleum, chemical, rubber, and plastic products	19	–1.7	–3.5	–2.7	–4
Paper and paper products	5	–4.4	–9.0	–7.0	–2
Textiles and apparel	4	–3.7	–6.2	–5.0	–1
Total	252	–2.1	–0.8	–1.2^b	–24^b

Sources: OECD; BCG analysis.

Note: The 2020 gains and losses in manufacturing jobs were calculated by extrapolating and adjusting the number of jobs after 2011, based on the growth rate from 2000 to 2011.

^aExtrapolated from the growth rates for 2000–2011.

^bThis total represents the sum of individual industries.

Swedish manufacturing prospects will brighten if the krona depreciates to levels of the recent past, enabling the country to attract work from neighboring economies. But if the krona remains strong owing to financial turbulence in the Eurozone, export-dependent industries such as machinery, motor vehicles, and electrical components could be hit much harder.

Continued erosion of the Nordic manufacturing base will likely have serious ramifications for the region’s economies.

Implications Beyond Manufacturing

Continued erosion of the Nordic manufacturing base will likely have serious ramifications for the region’s economies. Manufacturing companies not only contribute jobs and

strong trade balances, but they also support adjacent industries. A Swedish academic study estimated that each manufacturing job indirectly creates an additional 1.2 jobs for the economy, compared with 0.4 for each service industry job. Simply replacing manufacturing with service jobs, therefore, would still result in a significant net employment loss.

Lower manufacturing employment hits small cities especially hard, an important factor given the Nordic region’s sparse population. Reductions in manufacturing jobs typically lead to structurally high unemployment. Research has shown that when manufacturing jobs disappear, service industry jobs are also lost. More new service jobs are typically created in larger cities and in different sectors, leading to a mismatch in both talent and geography.

Offshoring at the level we forecast would weaken Nordic industrial competitiveness even further because R&D tends to follow manufacturing over time. Technical knowledge of manufacturing processes is often a prerequisite to innovation and to the ability to design products to high standards of quality and sophistication. From 2001 to

EXHIBIT 18 | Sweden Is Projected to Lose About 75,000 Manufacturing Jobs by 2020

Key industries	Number of jobs, 2011 (thousands)	Jobs CAGR (%) 2000–2005	Jobs CAGR (%) 2005–2011	Projected jobs CAGR (%) 2011–2020	Projected job losses, 2011–2020 (thousands)
Motor vehicles, trailers and transportation equipment	98	–2.4	0.7	–0.7 ^a	–6
Machinery and equipment	86	–1.9	–0.8	–1.3 ^a	–9
Fabricated metal products	73	–1.5	–1.0	–1.2 ^a	–8
Petroleum, chemical, rubber, and plastic products	64	0.0	–1.4	–0.8 ^a	–4
Electronics	63	–7.6	–2.4	–2.4 ^b	–12
Wood products and furniture	61	–1.3	–0.6	–1.0 ^a	–5
Food, beverages, and tobacco	56	–3.2	–1.5	–2.3 ^a	–11
Basic metals and nonmetallic mineral products	50	1.5	–1.9	–0.4 ^a	–2
Publishing, printing, and media	40	–3.7	–3.5	–3.6 ^a	–11
Paper and paper products	34	–0.9	–2.9	–2.0 ^a	–6
Textiles and apparel	8	–7.2	–1.3	–1.3 ^b	–1
Total	634	–2.4	–1.3	–1.4 ^c	–75 ^c

Sources: OECD; BCG analysis.
Note: The 2020 gains and losses in manufacturing jobs were calculated by extrapolating and adjusting the number of jobs after 2011, based on the growth rate from 2000 to 2011.
^aExtrapolated from the growth rates for 2000–2011.
^bExtrapolated from the growth rates for 2005–2011, since a large share of jobs had already been outsourced during the previous period.
^cThis total represents the sum of individual industries.

2006, only 13 percent of the Danish companies that shifted manufacturing offshore also shifted R&D. But that percentage rose to 18 percent from 2007 to 2010, and we project that it will surpass 20 percent in the next year or two.

Many of the Nordic manufacturing executives we interviewed reported that while Chinese officials courted them to move production to China a decade ago, now officials are trying to persuade them to shift R&D jobs. Several Nordic companies have already moved some R&D abroad. When asked why they keep some or most R&D at home, many Nordic

companies cited intellectual property concerns and the availability of skilled labor. Others, however, noted that once their more experienced engineers retire, they will begin hiring at their foreign locations.

NOTE

1. These figures do not include companies formed as the result of mergers and spinoffs.

CREATING A NEW DEAL FOR NORDIC COMPETITIVENESS

DENMARK, FINLAND, NORWAY, AND Sweden still have time to restore their global competitiveness in manufacturing. With the right mix of policies and corporate investment, Nordic economies can prevent a significant share of the labor force reductions that we project. By taking decisive action now, the region can also ensure that manufacturing will remain a powerful contributor to future economic growth and job creation.

Ensure Cost Competitiveness

Nordic manufacturers will inevitably continue to establish new production capacity outside of the region in order to align their footprints with growing offshore demand, especially in Asia and the U.S. But policymakers can prevent more Nordic manufacturing jobs from migrating elsewhere in Europe. To do so, they must take action to restore the region's cost competitiveness compared with other European economies. This is especially true for Norway and Denmark.

The region's governments have recently taken some measures to address costs. Both Finland and Sweden have moved to lower corporate tax rates. The Danish government has proposed doing the same, along with other measures, under a plan it has released to improve the country's cost position. However, current efforts are neither deep enough nor broad enough to comprehensively address

the cost-competitiveness of salaries, individual and corporate taxation, and energy. More aggressive action will be required to achieve those goals and to increase productivity in all sectors of the Nordic economies, including the public sector.

Remove Growth Inhibitors for Small Companies

The continued success of small and midsize companies is critical for maintaining a strong manufacturing base in the Nordic economies. Policymakers should therefore work hard to lower barriers to new hiring, increase labor flexibility, and reduce administrative burdens on smaller companies in order to provide an environment that supports growth. It is also critical for smaller companies—particularly outside of the large urban regions—to have access to a strong talent base.

Get More Leverage Out of R&D Investments

The Nordic countries have long been leaders in innovation. To keep this advantage from diminishing, public investments in R&D and business development can be improved. Each country now channels this capital through fragmented vehicles that focus on different things. Policymakers should ensure that the investments do not simply go to ventures either already funded by private capital or

with access to it. Government should also lower the administrative costs of these investments. For example, management costs at venture-capital company Fouriertransform, owned by the Swedish government, equal around 10 percent of invested capital.

Rebuild the Capability and Talent Advantage

Nordic policymakers need to ensure that the pool of highly skilled manufacturing personnel for hire remains sufficient, one of the region's key competitive advantages. If the manufacturing workforce continues to age at its current pace, Nordic manufacturers will have to look offshore for highly productive personnel. A first step is to provide greater manufacturing-employment opportunities for 18- to 26-year-olds and to ensure higher enrollment rates of students in vocational training after their nine years of mandatory schooling. Efforts are also needed to raise the status and profile of technical and vocational education and careers.

Toward a Revitalized Nordic Manufacturing Sector

A vibrant Nordic manufacturing sector is important not only for fostering a robust economy but also for building a healthy services sector, for preserving leadership in innovation, and for providing high-skilled jobs for the region's underemployed youth.

Slowing, much less reversing, the decline in factory employment in the Nordic region will not be easy. But businesses and the public sector can do much to strengthen the region's competitiveness and ensure a strong manufacturing sector.

The region needs a sense of urgency about developing and enacting a strategy to build manufacturing competitiveness. Without it, our analysis shows, the erosion of Nordic manufacturing that began three decades ago is likely to continue.

The challenges are daunting. But we believe that the individual economies of Denmark, Finland, Norway, and Sweden have assets that can be leveraged to preserve manufacturing as a key driver of economic dynamism and diversity, foster growth in well-paying jobs, and create the next generation of major global companies. We hope that our work will spur discussion that generates an agenda to improve competitiveness.

FOR FURTHER READING

The Boston Consulting Group produces many publications that may be of interest to management teams. Recent examples include the publications listed here.

From Wealth to Well-Being: Introducing the BCG Sustainable Economic Development Assessment

A report by The Boston Consulting Group, November 2012

The U.S. Manufacturing Renaissance: How Shifting Global Economics Are Creating an American Comeback

An e-book by Harold L. Sirkin, Justin Rose, and Michael Zinser, Knowledge@Wharton, November 2012

Why a Skills Gap Is Unlikely to Constrain a U.S. Manufacturing Resurgence

BCG article, November 2012

Why America's Export Surge Is Just Beginning

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U.S. Manufacturing Nears the Tipping Point: Which Industries, Why, and How Much?

A Focus by The Boston Consulting Group, March 2012

Made in America, Again: Why Manufacturing Will Return to the U.S.

A Focus by The Boston Consulting Group, August 2011

Rethinking Operations for a Two-Speed World

A report by The Boston Consulting Group and Knowledge@Wharton, February 2011

Preparing for a Two-Speed World: Accelerating Out of the Great Recession

BCG White Paper, December 2009

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Acknowledgments

This report was produced by BCG's Operations practice. It would not have been possible without the contributions of the working team of Carl Wikner, Ville Haussila, Unn Hellberg and, later, Alexandra Winther, Niklas Brantberg, and Riku Nevalainen. The authors would like to acknowledge the contributions of Patrik Eliasson, Mats Reiersen, Pia Hardy, Nausherwan Ghaffar, Lars Fæste, Jesper Kjerside, Bent Dyhre Hansen, Ulrik Sanders, Andreas Wester Hansen, Henrik Ljungberg, Tuukka Seppä, and Ketil Gjerstad.

Harold L. Sirkin, Michael Zinser, and Justin Rose provided valuable guidance with their Made in America series expertise. Thanks also go to the more than 20 companies in four Nordic nations whose representatives we interviewed during the fall of 2012.

Finally, the authors wish to thank Pete Engardio for his contributions to writing this report and to Katherine Andrews, Gary Callahan, Lilith Fondulas, Kim Friedman, Laura Karotie, Sara Strassenreiter, and Karen Jhalli-Madsen for their help with marketing, editing, production, and publicity.

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