W.E. UPJOHN INSTITUTE FOR EMPLOYMENT RESEARCH

Employment Research Newsletter

Volume 19 | Number 3 Article 3

7-1-2012

Employment Research, Vol. 19, No. 3, July 2012

Citation
W.E. Upjohn Institute. 2012. Employment Research 19(3). https://doi.org/10.17848/1075-8445.19(3)

UPJOHN INSTITUTE

Employment Research

JULY 2012

In this issue . . .

Vol. 19, No. 3

Employment Research is published quarterly by the W.E. Upjohn Institute for Employment Research. Issues appear in January, April, July, and October.

The Institute is a nonprofit, independent research organization devoted to finding and promoting solutions to employment-related problems at the international, national, state, and local levels. The Institute is an activity of the W.E. Upjohn Unemployment Trustee Corporation, which was established in 1932 to administer a fund set aside by Dr. W.E. Upjohn, founder of the Upjohn Company, to conduct research on the causes and effects of unemployment and seek measures for the alleviation of the hardships suffered by the unemployed.

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The Debate over the State of U.S. Manufacturing

How the Computer Industry Affects the Numbers and Perceptions

Since 2000, the U.S. manufacturing sector has lost 5.5 million jobs, or about a third of its employment base. In response to these employment losses, a large trade deficit in manufactured goods, and concerns that U.S. manufacturing is losing its international competitiveness, President Obama recently announced the creation of a new cabinet-level Office of Manufacturing Policy.

The administration's move to develop policies promoting U.S. manufacturing has many detractors, however. At the heart of the debate over the appropriate policy response is a basic disagreement over the actual state of U.S. manufacturing. Those who oppose government intervention typically argue there is little need. They point to robust output growth in manufacturing that, except during recessions, has outpaced average annual growth of the U.S. economy for decades. Employment losses, it is argued, are largely a consequence of extraordinary productivity growth, which in turn reflects automation, not import competition. The U.S. manufacturing sector is healthy, according to this view. There is little or nothing to fix.[1]

The purpose of this article is to help reconcile the apparently contradictory sets of statistics that are brought to the debate. In particular, I argue that the aggregate manufacturing output and productivity statistics so commonly cited are widely misinterpreted.

Aggregate statistics mask quite divergent trends within manufacturing. The rapid output and productivity growth of the manufacturing sector is largely attributable to one small industry: computers and electronic products. For most of manufacturing, output growth has been relatively weak and productivity growth modest. In addition, the extraordinary output growth in the U.S. computer industry does not signal U.S. competitiveness in manufacturing computer and electronic products, and productivity growth has not caused the steep employment declines in this industry.

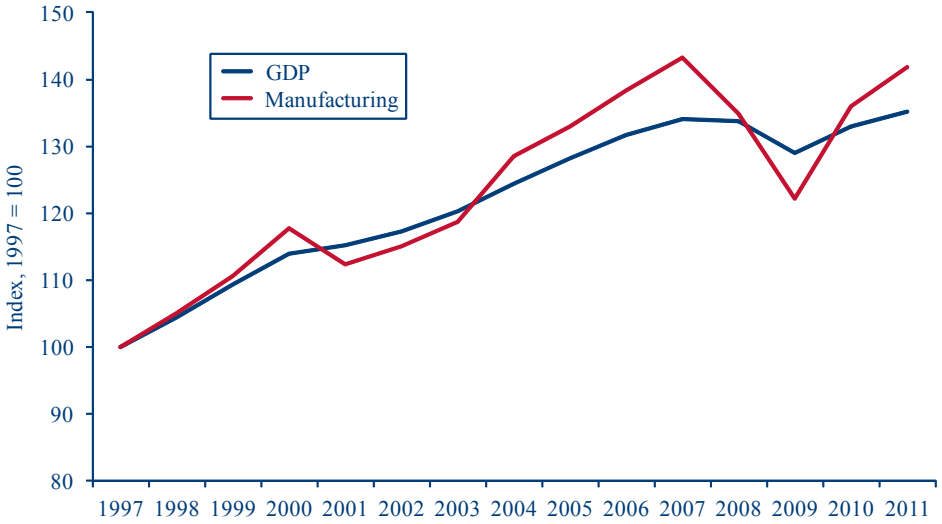
Different Statistics Paint Different Pictures

Output statistics such as those depicted in Figure 1 paint a rosy picture of the U.S. manufacturing sector. The figure, which plots indexes of real (price-adjusted) GDP and manufacturing value added from 1997 to 2011, shows that, except during recessions, growth in manufacturing real value added outpaced growth in real GDP. Over the entire time period, manufacturing output growth was greater than that of GDP.

In spite of its strong output growth, manufacturing employment has been

ISSN 1075–8445

Figure 1 Growth in Real GDP and Manufacturing Value Added, 1997–2011

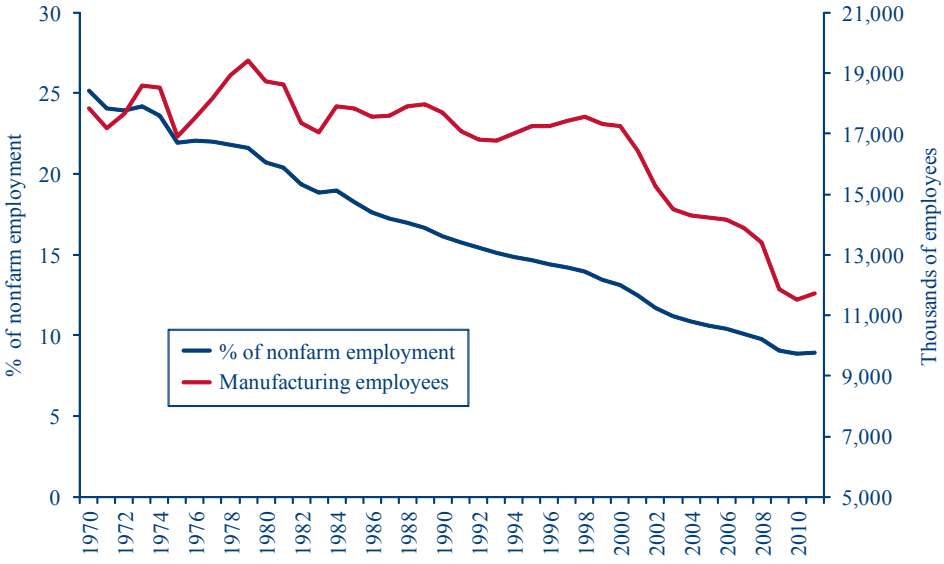


SOURCE: Bureau of Economic Analysis.

declining as a share of nonfarm payroll employment since the 1970s (Figure 2). The divergent output and employment trends are typically explained by the fact that labor productivity growth in manufacturing has also greatly outpaced that in the aggregate economy. From this perspective, recent employment declines in manufacturing seem part of a long-term trend. Numerous analysts have made analogies between the manufacturing sector and agriculture, which has experienced high output growth, but supports few jobs owing to the automation of farming. (See, for example, Reich [2009], Executive Office of the President [2009], and Roxburgh et al. [2012].)

A closer look at the manufacturing employment numbers, however, reveals a clear break in trend since 2000. Figure 2, which also plots manufacturing employment levels from 1970 to the present, shows that manufacturing employment was relatively stable or experienced modest trend declines until 2000.[2] From 2000 to 2002 manufacturing employment fell by 2 million, or 12 percent, and during the ensuing economic upturn, manufacturing employment continued to fall; this marked the first time manufacturing employment failed to rebound following a recession. Over the decade from 2000 to 2010, manufacturing employment declined by 5.7 million, or one-third. The sudden and sharp employment losses in the manufacturing sector are hard to fully square with a story about productivity improvements driven by automation. And although press reports have heralded manufacturing's employment gains in the last year, they are small compared to its losses during the Great Recession. Today, nonfarm payroll employment is 96 percent of what it was in 2007, immediately prior to the start of the recession; manufacturing employment is just 87 percent.

Figure 2 Manufacturing Employment, Number and as Percent of Nonfarm Payroll Employment, 1970-2011



SOURCE: Bureau of Labor Statistics.

Trade statistics also give cause for concern about the state of U.S. manufacturing. Eighteen of the 19 industries in the manufacturing sector run sizable trade deficits, according to data published by the Bureau of Economic Analysis; that is, the United States imports more than it exports in these industries' product categories. Moreover, between 1998 (the first year that these industry-level data are published) and 2007, the ratio of net exports (exports less imports) to domestic use of an industry's products worsened. This implies that domestic manufacturing output failed to keep pace with domestic use of manufactured goods. The picture has been more mixed since 2007, reflecting the worldwide recession, but apparel, textiles, furniture, autos, electrical appliances, and computers continued to show a loss of competitiveness by this metric.

What Accounts for Manufacturing's High Output Growth?

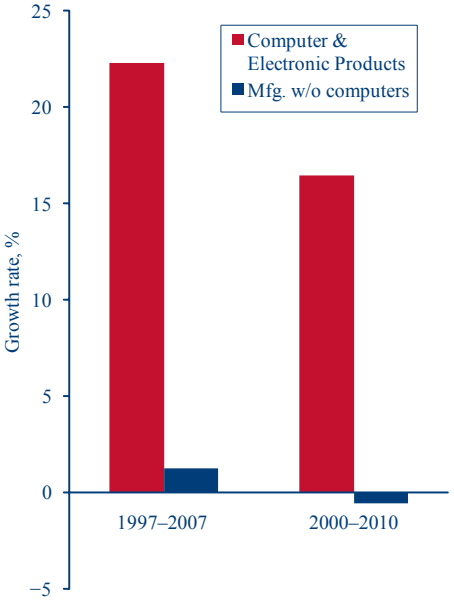
Manufacturing's strong growth in real value added seems at odds with the weak employment numbers and trade performance. These apparently

contradictory trends can be reconciled to a large degree by the fact that the manufacturing output statistics mask divergent trends within the manufacturing sector.

Figure 3 shows average annual growth in real value added for the computers and electronic products industry and for manufacturing excluding the computer industry from 1997 to 2007 (the decade leading up to the Great Recession) and from 2000 to 2010 (a period that incorporates the recession). Real value added in the computer industry grew at a staggering rate of 22 percent per year from 1997 to 2007 and 16 percent per year from 2000 to 2010. In contrast, average annual growth of real value added in the rest of manufacturing was just 1.2 percent per year from 1997 to 2007; real value added in the rest of manufacturing was actually about 6 percent lower in 2010 than at the start of the decade.

Although the computer and electronics products industry only accounted for 10–12 percent of value added in the manufacturing sector throughout the period, it has an outsized effect on aggregate manufacturing statistics. Without the computer industry, manufacturing real value-added growth has been much weaker than overall growth in the economy (Figure 4).[3] The computer industry has a similarly large impact on the aggregate manufacturing productivity statistics. For example, manufacturing multifactor productivity growth rates between 1997 and 2007 fall by almost half when the computer industry is excluded (Houseman et al. 2011).

Figure 3 Average Annual Growth Rates of Real Value Added in Computers and Manufacturing without Computers



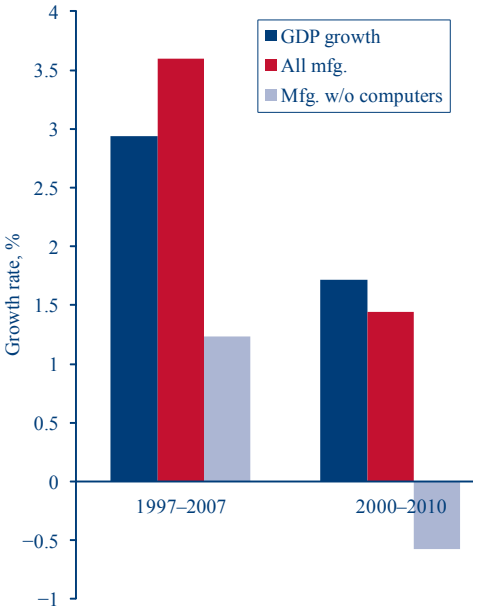
SOURCE: Author calculations using Bureau of Economic Analysis data.

The growth rates in Figures 3 and 4 are based on published data. In addition, the sizable growth of imported intermediates used in manufacturing has likely imparted a significant bias to real value added in the published statistics for all manufacturing industries. This bias arises because the price declines associated with the shift in sourcing to low-cost countries are not properly captured, which in turn results in an underestimation of the real growth in imports and an overestimation of the growth in real value added produced domestically. Accounting for offshoring bias, the average annual growth rate in real value added for manufacturing excluding computers was well under 1 percent between 1997 and 2007 (Houseman et al. 2011).

What Accounts for the Extraordinary Growth in Real Value Added and Productivity in the Computer Industry and What Does It Mean?

Is the computer and electronic products industry, which includes computers, semiconductors, and telecommunications equipment, the bright spot in American manufacturing? Not necessarily. Although some computer and electronics products companies headquartered in the United States are highly successful in product innovation and are competitive in international markets, the United States does not produce high-volume products in this industry anymore (Sturgeon and Kawakami 2010). And trade statistics cited above indicate that domestic production has not kept pace with consumption, leading to a widening trade deficit in these products.

Figure 4 Average Annual Growth Rates of Real GDP and Manufacturing Value Added



SOURCE: Author calculations using Bureau of Economic Analysis data.

What accounts then for the rapid growth in real value added in this industry? At least part of the explanation concerns the adjustment of price indexes used to deflate computers and semiconductors for improvements in quality. Computers and semiconductors are much more powerful today than they were a decade or even a year or two ago. Although product price indexes typically increase over time, for computers and semiconductors they have fallen rapidly. Largely reflecting adjustments by statistical agencies to account for the increased power of computers and semiconductors, the price indexes used to adjust shipments of computers and semiconductors have fallen at a rate of 21 percent and 13 percent per year, respectively, from 1998 to 2010. Such rapid price drops imply, for example, that for the same dollar value of computer shipments, the quality-adjusted quantity (real value) is 13 times higher in 2010 than in 1998.[4]

The rapid growth in real output coupled with a sharp drop in employment has led to surging productivity in the computer industry. But has productivity

growth caused these employment declines? Analysts often interpret productivity growth to mean that workers are working faster or that automation (the substitution of capital for labor) is driving the growth, as illustrated in a recent White House report on manufacturing: "Manufacturing workers have paradoxically often been the victims of their sector's own success, as rapid productivity growth has meant that goods can be produced with fewer workers" (Executive Office of the President 2009).

Underpinning the computer industry's rapid productivity growth, however, are price deflators that, when adjusted for quality improvements, are rapidly falling. The productivity growth in the computer industry largely reflects research and development innovations, and product improvements do not cause job losses. Today's computer may be in some statistical sense the equivalent of, say, 13 computers in 1998, but that does not, in and of itself, mean that fewer workers are needed to manufacture a computer today than in the past. In fact, job losses in the computer industry are attributable to the shift of electronics product manufacturing to Asia (see, for example, Roxburgh et al. 2012).

Conclusion

Strong output and productivity statistics have led many to dismiss out-of-hand concerns about the international competitiveness of U.S. manufacturing. The computer and electronics products industry, however, is driving these high growth rates in the aggregate statistics, despite the fact that this industry accounts for only about 10 percent of the sector's value added and employment. The irony is that high output growth in the computer industry is a poor metric of the competitiveness of U.S. factories in making computer and related electronic products. The manufacturing of these products has largely moved to Asia. Competition from foreign suppliers, not high productivity growth, is responsible for the sharp employment declines in the computer industry.

Understanding the international competitiveness of manufacturing and the consequences of import competition for workers and businesses is critical for developing sound manufacturing policy. As a start, analysts and policymakers should recognize that the aggregate output and productivity statistics are not representative of what is happening in most of manufacturing.

Notes

1. See, for example, Kevin Hasset, http://www.bloomberg.com/news/2010-08-16/obama-s-obsession-drives-progress-in-reverse-commentary-by-kevin-hassett.html and Mark J. Perry, http://blog.american.com/2012/02/u-s-manufacturing-is-already-doing-remarkably-well-without-taxpayer-help/. Atkinson et al. (2012, pp. 24–25) includes citations to many other prominent analysts and policymakers promoting this view.

2. The modest declines in manufacturing employment during the 1990s can be accounted for entirely by manufacturers' increased use of staffing industry workers, who are not counted as manufacturing employees. Although in official statistics manufacturing employment declined by 4.1 percent from 1989 to 2000, taking into account temporary help and other staffing workers assigned to manufacturing, employment rose by an estimated 1.3 percent (Dey, Houseman, and Polivka forthcoming).

3. The reason this fact is not more widely known may have to do with the way the statistics are published. In the late 1990s, the Bureau of Economic Analysis, along with the other U.S. statistical agencies, introduced the use of chained aggregates. Although BEA publishes value added in "real chained dollars" for all individual manufacturing industries, these industry-level real chained dollars cannot be summed to create a real series for subsets of industries. Growth rates for industry subsets may be approximated using a Törnqvist formula that uses both real and nominal value-added industry data. Specifically, the growth rate of real value-added for a subset of industries, expressed as a logarithmic change, is approximately equal to the weighted average of the growth rates of the component industries,

$$\ln(Q_t / Q_{t-1}) \approx \sum_i w_{i,t} \ln(q_{i,t} / q_{i,t-1})$$

where $q_{i,t}$ is the published real dollar or (equivalently) quantity index for industry i in year t and $w_{i,t}$ is the average of industry i's share of nominal value added in adjacent time periods $(t, t-1)$; $\sum_i w_{it} = 1$.

4. The statistics for the computer and electronics products industry also may be subject to significant measurement error, in addition to that discussed above. This industry has been characterized by rapid shifts in the sourcing of production and the development of global production chains that are difficult to capture in our statistical system, as currently designed. Such measurement error is the subject of on-going research supported by a Sloan Foundation grant that I am codirecting.

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Bridget Timmeney and Kevin Hollenbeck

What Works in Forming a Successful Employer Resource Network?

This article summarizes findings from a recent issue brief on Employer Resource Networks (Timmeney and Hollenbeck 2012).

Employer Resource Networks (ERNs) evolved in western Michigan over the last 10 years in response to business owners' concerns about the retention and skill levels of their workforces. These business owners have realized that recruitment and retention of a qualified workforce are central ingredients for organizational success. Out of these concerns arose consortia of businesses that leverage resources for the benefit of the member businesses, their employees, and for the communities where the businesses operate. The goals of these ERNs are to provide sustainable employment throughout all segments of the workforce by efficiently utilizing community supports, and help under- and unemployed residents of the community maintain employment and move into economic self-sufficiency.

These networks have been particularly successful with small and midsized firms that pool resources to accomplish together what they cannot accomplish individually. The distinguishing feature of each ERN is that participating businesses pay membership fees that are used to fund a case manager—referred to by ERN members as a "success coach"—from the public human services system to locate on-site at each business or in a central location.

Participating employers expect to experience lower turnover rates and lower consequent hiring costs, reduced expenses and hassles associated with worker tardiness and absenteeism, and improved productivity. These benefits are expected as workers, facilitated in many cases by the success coach, are better able to focus on their work activity and stay on the job longer. Employers also expect some cost savings related to training and worker skill development through this consortium approach to human resource support and services.

This article presents the results from a survey that was conducted to determine the components necessary to form a successful ERN. Thirteen representatives from six west Michigan ERNs were interviewed to gather evidence reflecting on seven issues that emerged from a study contrasting the launch and operations of two of the six ERNs during the fall of 2010. (See Hollenbeck, Erickcek, and Timmeney 2011).

The survey respondents were purposively chosen and, for the most part, were ardent supporters of ERNs at participating firms. Of those interviewed, two were company owners and the remaining were all vice presidents of human resources (HR) within the participating firms. The length of time that the ERNs had existed ranged from the conceptual stage in two sites to nearly 10 years at one of the sites. These particular respondents allow us to address seven questions about what works in forming a successful ERN through the perspectives of advocates who have diligently committed to the concept.

1) Is the size of the ERN important for success?

The ERNs represented by the interviewees ranged in membership size from 5 to 17 employers. Respondents confirmed our hypothesis that fewer than 5 employers may not be a viable number of firms for an ERN. They said that the minimum number of employers needed to create group synergy and cost effectiveness was 5–6, and emphasized that an ERN's optimal size depends on the number of employees at the firm and service usage amongst each of the firms.

Scale is important because it determines the individual firm's financial contribution to the consortium, and because governance and operation of the initiative requires the employers' investment of time and energy. The average employment level per firm in this study was approximately 75–100 employees (some ERNs included firms with much larger employment levels). Using this average employment level per firm and the minimum number of firms per ERN, the scale of employment at member firms must be at least 375–600. However, further variables must be considered when determining ERN size. Optimal scale must include a balance of considerations such as the number of employees receiving welfare assistance, firm size, utilization of services, geographic location and expanse of member firms, and industry mix.

In all of the interviews where the ERN was fully operational, the respondents believed that there were individuals whose jobs had been saved because of ERN intervention.

An issue closely related to scale is the fee structure of the ERN. Should fees be based on employment levels or utilization, or should there be a flat fee for all members? Utilization level was used by only one of the ERNs as the method for calculating fee structure. Representatives from other ERNs believed strongly that a flat fee is a more useful method. Utilization can vary significantly from year to year, and a varying fee means that costs must be argued for yearly with the CEO or upper-level management. Equal funding or a flat fee applied across all firms is easier to budget for and lessens the need for annual advocacy for participation. Some respondents also believed that under a utilization fee structure, firms with higher utilization, by right of paying higher fees, have more say in programming or design discussions, whereas a flat fee levels the

playing field for the smaller or midsized firms.

2) How do ERNs fare during a recession?

During the recent recession, firms were laying off substantial shares of their workforces. Some firms may be hesitant to invest in an ERN because of concerns about business or economic downturns. Even though ERNs exist to improve worker retention and skill building, in the recent recession, the respondents confirmed that ERNs still provided value in retention and recruitment. Success coaches dealt with situations in which family members other than the worker were laid off. Furthermore, when possible, networking HR managers in the ERNs assisted each other in placing workers who were laid off. Not only did the success coaches provide value to the firms and employees, the HR managers and firms reaped the benefits of the network of HR knowledge and connections.

3) Is it important to have sectoral diversity?

The existing ERNs have members from across a spectrum of industries. Respondents indicated that this enhanced the sharing of experiences and policies. Furthermore, the diversification dampened the effect of the business cycle as some firms had stable employment levels over the cycle and others fluctuated. A health care collaborative did emerge and functioned well, but coincidentally has merged with another nearby multisector network in an effort to streamline network coordination costs.

4) Can ERNs succeed if member firms are not located near each other?

The neighborhood model of an ERN has many advantages, but most of the individuals interviewed in this study were in ERNs that covered fairly wide geography. The trade-off for the latter is that these ERNs must achieve scale, but they must also operate within an area that can be efficiently served by a success coach. An ERN located in a small geographic area is most likely to be successful in a larger metropolitan area with a concentration of firms.

5) Are ERNs more successful if they have ties to other ERNs?

The achievements and energy of an ERN seem to be enhanced if it has ties to another ERN. The growth and success of four of the ERNs were somewhat dependent on the spillover in awareness from the original two ERNs' experience and successes. Conversely, the demise of the one ERN no longer in existence can be partially attributed to a "cold" start. In that case, none of the participating firms had had any experience with an ERN. Rather, the firms that joined the initiative committed to participate based on evidence presented to them about the success of other ERNs.

In contrast, many of the health care firms in other successful ERNs have an industry connection, and several of the manufacturers have employed vice presidents of human resources that were previously employed in HR at founding member companies of the original ERN. The five representatives interviewed from the ERNs in the start-up phase all indicated that their knowledge and contacts with HR professionals at the operational ERNs were instrumental in their explorations of the feasibility and subsequent commitment to participation in their local ERNs. These interactions depict yet another networking benefit of ERNs versus starting from scratch.

6) What are the roles of HR managers and other upper-level management/ owners in successful ERNs?

Clearly an investment in an ERN requires CEO or upper-management approval, and thus they are the targets of marketing efforts, which may come from an internal source—usually the vice president of HR—or from other CEOs or management. Once upper-level managers decide to participate, however, they typically do not participate in the ERN.

The interviews confirmed that ERNs exemplify the importance of aligning incentives. The HR representatives interviewed all indicated that their jobs were made easier with the availability of a success coach, who improved employee retention and, in many cases, offered valuable training. The respondents reported that the benefits of participation clearly outweighed the fees paid by the firm for participation. Without an ERN, the firms would have had to rely on their own resources to address employee performance or attendance issues, usually without clear knowledge or time to address the possible underlying causes. A success coach is specifically trained and can offer years of experience with this base of knowledge.

In all of the interviews where the ERN was fully operational, the respondents believed that there were individuals whose jobs had been saved because of ERN intervention. They said that ERN participation had saved the firm the costs of terminating these employees, recruiting replacements, and training the new hires. Since employee participation and service provision are confidential, the HR staff members do not know who is served or the specific services they have been provided. However, the survey respondents indicated that transportation was the primary need that was addressed, along with auto repair, financial help, and assistance with food and utilities.

Two HR managers interviewed independently commented that the ERN model offered a concrete way to engage in the workforce development system. They found the model to be mutually beneficial to their firms and their workers as well as a means to contribute to the local human services delivery systems. This aspect of the ERN concept was also a tool that these HR managers used to sell participation and the associated fee to upper management.

7) What are the networking advantages of ERNs?

As with any business start up, ERNs have a business plan to guide their development. As the ERN moves from a group of interested firms convening around the concept to the stage of launching and implementation, these business plans are developed by the founding members of the ERN. Close relationships develop between the

participants, especially when they share the common role of HR professional in their firms. It is through this process that the governing group becomes a resource for networking.

Each of the respondents commented that networking, regardless of industry representation or geographic proximity, serves as a valuable function of the ERN. The ERNs meet on at least a quarterly basis, but communication occurs frequently in between meetings. In person, or more often by phone, representatives share practical experience on issues such as how to control costs, how to adjust to a new personnel policy, or mutual training needs. An issue that was a primary barrier in all firms was communicating to all employees the services available from the success coach. Through the networking, ERN supporters shared ideas on how to successfully market the ERN within their organizations. Ultimately, it was during these regular discussions that participating firms learned how they could potentially share services that facilitate the implementation of the business plan and enable the ERN to thrive.

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Timmeney, Bridget, and Kevin Hollenbeck. 2012. "Employer Resource Networks: What Works in Forming a Successful ERN?" Issue Brief. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

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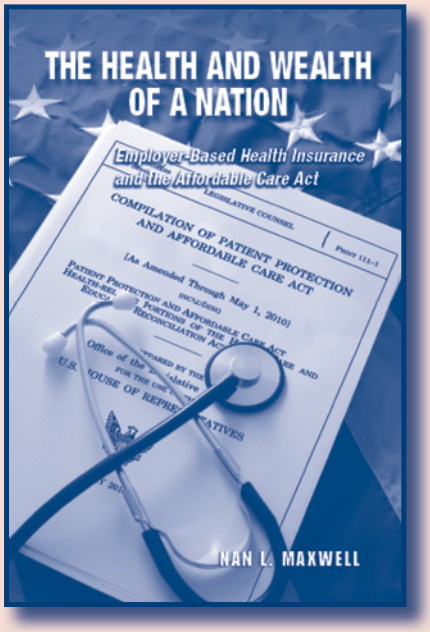
New Book on the Affordable Care Act

The Health and Wealth of a Nation

Employer-Based Health Insurance and the Affordable Care Act

Nan L. Maxwell

In this timely new book, Nan L. Maxwell examines the behavior of firms with respect to their provision of health care prior to ACA deliberations and uses those behaviors to forecast changes in employer-sponsored health insurance (ESI) once the ACA is fully implemented. Her analysis focuses on potential changes in the ESI offer due to implementation of ACA provisions concerning access and quality.



"Because the ACA structures provisions to narrow gaps in the ESI offer, my research can shed light on the extent to which the ACA provisions might change the ESI offer, and whether changes are likely to reduce disparities between low-wage and high-wage workers."
–Nan L. Maxwell

Maxwell's findings include:

- The ACA will likely influence the behavior of virtually all firms that offered health insurance at the time of its passage.
- The ACA is unlikely to incentivize small firms to offer health insurance if they did not already offer it when the act was passed.
- The differences in ESI coverage and quality of the offer made to low-wage and high-wage workers is likely to converge when the ACA is fully implemented.
- Disparities in the offer of benefits other than health insurance might increase between low-wage and high-wage firms.

Nan L. Maxwell is a senior researcher in the Oakland, California, office of Mathematica Policy Research. She was formerly a professor and chair in the Department of Economics and the executive director of the Human Investment Research and Education Center (HIRE) at California State University, East Bay.

203 pp. July 2012
$40.00 cloth 978-0-88099-425-5 / $20.00 paper 978-0-88099-423-1

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