Comment

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Employment growth in the United States (and also in many other Organisation for Economic Co-operation and Development [OECD] countries) over the last thirty years has been dominated by occupations at the two ends of the skill distribution, with so-called middle-skill jobs representing a smaller and smaller fraction of overall employment. A large literature has developed, focused almost exclusively on the secular trends associated with this process of “polarization.” Acemoglu and Autor (2011) represents an excellent summary of much of this work, documenting trend changes since 1960 and laying out a framework to understand the interaction between some of the economic forces at work.

As the title of the paper by Foote and Ryan suggests, a primary (though not sole) objective of this paper is to study the relationship between polarization and the business cycle. Another objective is to assess the extent to which the secular trend in polarization might be causally linked to the secular decline in male participation. This paper presents a wealth of data related to various aspects of polarization, and the authors are to be commended for the effort and care that has gone into the collection, presentation, and analysis of this data. There is no way to do justice to all of the information presented in the paper in the limited space that I have for these comments; each section of the paper offers a rich set of findings, several of which are surprising and intriguing. With so many different facts presented, the paper’s main messages can appear as somewhat diffuse, and with this in mind I would like to focus my comments around three specific questions of broad interest that I think the paper speaks to:
1. Is there an interaction between polarization and the business cycle? In particular, do researchers that study labor market outcomes during the recent recession need to explicitly incorporate polarization into their analyses?

2. What happens to individuals who lose middle-skill jobs?

3. To what extent has polarization caused the secular decline in prime-age male labor-force participation?

In what follows I deal with each of these in turn, but to preview my main comments, I think the paper is most successful in answering question 1, provides suggestive but not definitive evidence regarding question 3, and offers an answer to question 2 that is too limited in scope.

**Question 1: Is There an Interaction between Polarization and the Business Cycle?**

The initial motivation for this question appears in the introduction and is nicely summarized by figure 1, panel B. This figure shows that the (absolute) number of middle-skill jobs was effectively constant from 2006–2008, dropped dramatically (by more than 10%) during the recent recession, and then remained roughly constant. In contrast, both high- and low-skill jobs were roughly constant in absolute number during the recession, and increased since the recession ended. The figure would appear to imply that labor market dynamics in the recent recession were significantly affected by the secular factors driving polarization, and that as a result, efforts to understand what transpired in the labor market during the recent recession must necessarily include an explicit treatment of polarization.

Section II of the paper is devoted to assessing this more formally, and while there are many details and some subtleties, I think it is fair to say that the main conclusion from this analysis is that business-cycle dynamics of employment by skill level, especially middle-skill employment, are largely the same before and after the 1982 recession, which is when the polarization process seems to gather steam. To reach this conclusion the authors ask whether the relationship between the cyclical components of GDP and employment by skill level are different in post-1982 recessions than in earlier recessions. Intuitively, if declines in middle-skill employment, for example, have become more pronounced in recessions in the post-1982 period then this should appear as a greater response of middle-skill employment to changes in GDP.
I think the analysis in this section is quite compelling, and taken at face value it implies that polarization and business cycles can be studied independently of each other. My one critique of the analysis and discussion in Section II is that the authors do not come back to directly address why the patterns noted in figure 1, panel B are not evidence to the contrary. In fact, I think it is important for the authors to note that despite its intuitive appeal, figure 1, panel B is of virtually no value in answering this question, since this point is not properly appreciated and is often the source of mistaken inference. The issue is as follows: because this figure shows the raw data for employment levels, it necessarily reflects both trend and cyclical components and therefore cannot be used to draw inference about the cyclical component alone. In fact, the patterns in figure 1, panel B are exactly what one would expect to find in raw employment levels if there are constant underlying trends combined with stationary business-cycle fluctuations, with these two components operating completely independently of each other.

I illustrate this point through a simple example, with the specifics contained in the following three figures:

Figure 1 shows a constant negative trend in log employment and

![Fig. 1. Trend component](image)
figure 2 shows a simple stationary (and periodic) series to represent business-cycle movements, which I will interpret as log deviations from trend. Figure 3 shows the series for the log of total employment, which is simply the sum of the two series. Note that figure 3 displays exactly the same property as middle-skill employment in figure 1, panel B in Foote and Ryan: employment is constant during upturns and drops during downturns. But this pattern results from a specification in which by construction there is no interaction between the trend and cycle components, and the cycle is stationary. To be sure, generating constant employment during upturns requires that the cyclical and trend components are exactly offsetting. Small departures from this would generate dynamics in which employment could exhibit either slight upward or downward movements during upturns. Lastly, if we consider the opposite case of a sector with a positive underlying trend we could generate a time series for employment as displayed in figure 4.

Note that the behavior of employment in this figure matches the
Fig. 3. Total employment

Fig. 4. Employment with positive trend
pattern for low- and high-skill employment in figure 1, panel B of Foote and Ryan.

How does my simple example relate to the analysis in Foote and Ryan? In carrying out their analysis they first isolate the business-cycle component of the data by extracting a smooth trend, so they are effectively providing evidence for the fact that the business-cycle component is unaffected by the underlying trends in skill-specific employment, as assumed in the example.

Oddly enough, I may find the authors’ answer to question 1 to be more compelling than they do. In the conclusion, when highlighting the key takeaways from their analysis they write, “To construct an appropriate high frequency model of middle-skill employment, we would need to understand how rational middle-skill workers deal with declining long-run opportunities at a cyclical frequency.” But in taking the results from section II at face value, it is not clear to me that constructing such a model is a priority, either for the business-cycle literature or the polarization literature.

**Question 2: What Becomes of Workers that Lose Middle-Skill Jobs?**

A key feature of recent models of polarization, such as the one outlined in Acemoglu and Autor (2011), is the possibility that technological change can lead to a reallocation of workers across tasks. In this context, if there are fewer workers being allocated to routine tasks, it is an interesting empirical question to ask what happens to these workers. In Section III Foote and Ryan present a great deal of information about the nature of worker flows across occupation skill groups and through unemployment, both on average and over the business cycle. While there are lots of interesting facts here, I did not feel that the overall analysis of this question was as compelling or sharp as the analysis of the previous question.

First, when interpreting their findings the authors do not clearly acknowledge that the need for reallocation depends on employment levels and not employment shares. In the simple static model of Acemoglu and Autor (2011), any change in employment shares requires that some workers are reallocated from one task to another, but this is not true more generally. If overall employment is growing at the rate of 2% per year, then the employment share of an occupation with an employment share of 50% would experience a decrease in its employment share of roughly 1% without losing any workers if all new employment were in other occupations. Moreover, worker retirement implies that
even employment levels can decrease continuously without requiring any workers to be reallocated. As a simple guideline, if workers had working lives of 40 years and the age distribution within an occupation group were uniform, then net employment losses of 2.5% per year could be accommodated without any reallocation of workers across occupations. Figure 3, panels B and C in the paper show that absolute employment levels were increasing in both routine occupation groups until 2000. Although the trends in employment levels do turn negative after 2000, neither trend decline exceeds 2.5% per year. It follows that one cannot operate under the premise that there is any need for reallocation of existing workers, or that the need is constant over the post-1980 period.

Second, and related, the interpretation of the empirical findings seems to neglect the job-churning process that presumably takes place within sector/occupation cells. Davis and Haltiwanger (1992) noted long ago that even when the economy is in the deepest recession, job creation remains substantial, and that most job creation and destruction occurs within sector/geographic cells. Although I am not aware of any study that details job creation and destruction at the occupation/industry cell level, all of the other available evidence would suggest that simultaneous job creation and destruction are prominent here as well. If this is the case and there is any return to occupation/industry experience, we would expect the reshuffling of jobs across employers within these cells to be largely carried out by a reshuffling of workers within the same occupation/industry cell. That is, we would expect most workers in an occupation/industry cell who become unemployed to be reemployed in the same occupation/industry cell.

In view of this it is not at all clear what to make of the transition probabilities that the authors report in figures 11 and 12. For example, panel B of figure 11 suggests that more than 15% of all transitions into employment by unemployed workers whose previous employment was in a middle-skill job are to either high- or low-skill jobs. The authors suggest that this number is very small. I do not understand the basis for this assessment. Beyond the previous considerations, consider the following simple calculation. In the overall US economy, roughly 1.5% of all employed individuals exit into unemployment each month. Over the course of a year, and ignoring repeat spells, this amounts to almost 20% of the employment pool. Abstracting from other flows, if even 10% of these individuals in one occupation/industry cell were to move to a different occupation/industry cell, there would be an annual
employment decline of 2.0% per year, far larger than any trend declines found in the data.

Third, and I think most importantly, the analysis contains virtually no information on wages or wage changes. The paper adopts the standard occupation groupings of low, middle, and high skill. On average, occupations in the high-skill group have higher wages than occupations in the middle-skill group, which in turn have higher wages on average than occupations in the low-skill group. This of course does not imply that all high-skill jobs pay higher wages than all middle-skill jobs, or that all middle-skill jobs pay higher wages than all low-skill jobs. In fact, there is tremendous overlap of wage distributions across the three skill groups. It follows that a worker who transitions from a middle-skill job to a low-skill job may well experience a wage increase, and that a worker who transitions from a middle-skill job to a high-skill job may well experience a wage decrease. For that matter, even a middle-skill worker who loses his job and finds reemployment in another middle-skill job may experience a large wage decrease, consistent with the estimates from the literature on wage losses for high-tenure workers that are displaced. Because of this, it is of limited interest to examine the pattern of worker movement across occupation groupings without also examining what is happening to wages. Moreover, I think one of the main motivations for looking at worker reallocation across occupation groupings in the context of polarization is the potential implications for wage changes and inequality.

The upshot of this is that although understanding how polarization has affected the allocation of workers across tasks is a very interesting and important topic, it is also very challenging. One needs to look not only at occupational transitions but also wages, and one needs to consider the extent to which changes in occupational employment shares are achieved through the choices of new entrants and how this affects their lifetime income prospects. Ideally, I think this type of analysis requires a panel data set with information on both occupation and wages. While Foote and Ryan have presented a lot of information about specific transition patterns, it is not entirely clear what broader messages emerge.

**Question 3: To What Extent has Polarization Caused the Secular Decline in Male Labor-Force Participation?**

Figure 1, panel C in the paper displays the well known declining secular trend for the participation rate for prime-age males. This rate has
decreased from around 97% in the late 1950s to around 88% today. Roughly one-third of this decline happens prior to 1980, with the remaining two-thirds occurring subsequently. Foote and Ryan adapt an exercise in Acemoglu and Autor (2011) to study the link between polarization and prime-age male labor-force participation in the post-1980 period. When interpreting their results, presented in figure 14, the authors write, “The striking message of panel A is that falling demand for middle-skill tasks appears to completely explain the overall decline in labor-force participation among prime-age males.” I think it is intuitive and plausible that the forces driving polarization might have also had a significant effect on participation. I also think that the authors present suggestive evidence in support of this link. However, I am somewhat less convinced that they have provided compelling evidence about the magnitude of the causal effect of polarization on male labor-force participation.

The evidence that the authors present effectively amounts to showing that there is a correlation in the time series between polarization, as measured by the share of middle-skill jobs, and the decline in male participation, and that the groups with the largest declines are those groups that historically were more likely to work in middle-skill jobs. While this is consistent with polarization causing the decline in male participation, correlations do not imply causation. The reason that this is particularly important in this context is that there are secular trends in other closely related variables that might also be exerting an influence, and distinguishing between them is very challenging. Ultimately, I do not think that reduced-form regressions of the sort considered in this paper will allow us to make much headway in isolating the primitive causes of the decline in male labor-force participation.

Let me start by reproducing a table from Juhn and Potter (2006) on white prime-age male labor-force participation rates by educational attainment:

<table>
<thead>
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<tbody>
<tr>
<td>&lt;High school</td>
<td>94.6</td>
<td>90.0</td>
<td>85.9</td>
<td>83.2</td>
<td>82.8</td>
<td>–11.8</td>
</tr>
<tr>
<td>High school</td>
<td>98.1</td>
<td>96.3</td>
<td>94.5</td>
<td>91.9</td>
<td>89.4</td>
<td>–8.7</td>
</tr>
<tr>
<td>Some college</td>
<td>96.7</td>
<td>95.6</td>
<td>94.9</td>
<td>93.0</td>
<td>91.4</td>
<td>–5.3</td>
</tr>
<tr>
<td>≥ College</td>
<td>97.7</td>
<td>97.3</td>
<td>97.4</td>
<td>95.9</td>
<td>95.2</td>
<td>–2.5</td>
</tr>
</tbody>
</table>
The clear takeaway from this table is that the decline in participation is monotone in educational attainment, with less educated groups displaying the largest declines. It follows that any variables that are correlated with educational attainment in the cross section and possess a trend in the post-1980 period would likely appear to “explain” the decrease in prime-age male participation when included in a simple regression analysis. This makes it very challenging to establish that it is polarization per se that is the cause of the decline. Let me note two other closely related but distinct possibilities. First, as others have suggested in the literature, perhaps it is simply the decline in the relative employment share of the manufacturing sector that is responsible for the decline in male participation. Note that the decline in the employment share of manufacturing is conceptually distinct from polarization, a point that Foote and Ryan emphasize in discussing figure 9. Moreover, since the decline in the manufacturing employment share starts long before 1980, it might also help to account for the significant earlier decline in participation.

Second, given that the wages of less educated individuals have fallen relative to more educated individuals, it is possible that the changing return to education is the key factor. Again, changes in the return to education are conceptually distinct from polarization.

Unfortunately, all of these factors are highly correlated in the post-1980 period, making it virtually impossible to distinguish between them using simple regression analysis. For example, in panel A of table 14, the $R^2$s are only marginally higher when adding skill-group shares in addition to the education dummies. Ultimately, I think one will need to take a more structural approach that explicitly considers the evolution of choices over the life cycle and makes use of more data (most prominently wages) in order to make headway on this issue.

Endnotes

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1. A similar pattern was previously emphasized in the work of Jaimovich and Siu (2013), who showed that employment in middle-skill jobs since the 1982 recession has this same pattern: roughly constant during upturns with sharp persistent declines during recessions.

2. $R^2$s are not reported in the text, but the authors provided this information to me.
References


