Globalization and Jobless Recoveries

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Abstract

Over the past 20 years, following recessions, recoveries in labor markets have been slow and weak relative to their post-war average. Over the same period, the United States has become increasingly open to trade and global forces. In this paper, I argue that changes in labor market outcomes can be tied to increased globalization. I build a model in which increased openness to growing economies generates a downward trend in employment which is amplified by recessions, thus generating jobless recoveries. I provide empirical evidence for the relationship between globalization and labor market outcomes and I show that the model is able to qualitatively match not only the targeted changes in labor markets, but also a persistent negative trade balance and increasing income inequality.

*University of Richmond. All errors are my own.
1 Introduction

In the post-war era, the labor market typically begins to recover one to two quarters after GDP begins to recover. Moreover, once this growth begins, it tends to be strong. However, in the three most recent recessions, labor markets have seen recoveries that have been both slow and weak relative to previous recoveries, earning them the moniker “jobless recoveries.” Even when one accounts for the fact that GDP growth has been slower in these recoveries than in earlier ones, the sluggishness of the labor recoveries is remarkable. Much attention has been paid to this change in the business cycle features of labor markets. However, less attention has been paid to the secular changes that have occurred over the same period. In particular, the employment to population ratio has been falling since its 2001 peak and is currently at a level that has not been seen since the early 1980’s, having fallen about 6 percentage points, from a peak of about 64% to its current level, 58%. In all previous business cycles, the employment to population recovered to its pre-recession peak. In fact, it has consistently risen since the early 1970’s, when women began to join the workforce en masse.

The uncharacteristically high and persistent unemployment rate that has followed the Great Recession has renewed interest in the jobless recovery phenomenon. In particular, many have wondered what has made the recovery following the Great Recession so different from the one in the early 1980’s. In this paper, I argue that jobless recoveries are related to trend growth in emerging markets and international opening. I have in mind that these emerging markets offer companies opportunities for expansion but costly reallocation assures that they wait until the potential benefit of reallocation outweighs the costs. Recessions provide such an opportunity since lower productivity in the advanced country makes the
cost of reallocating resources relatively lower in a recessionary period. I offer evidence that this reallocation is occurring over the time period in which jobless recoveries have emerged. Moreover, I show that labor market outcomes can be tied to increasing globalization.

In order to explore my hypothesis further, I build a modified growth model. In the model, a multinational cooperation chooses either to produce in an advanced, high productivity country which is not growing or in an emerging, lower productivity country whose productivity is growing. The multinational produces a final consumption good using labor and managerial services \(^1\) which are produced in the advanced economy but can be reallocated and used for production in the emerging economy. There are two forces operating in the model. The first is the relative growth of the emerging country. This leads to the secular shift of managerial services and, thus, production to the emerging market. The second is the mechanism which slows this secular shift and assures that it occurs primarily during recessions: a cost of adjusting the use of managerial services in each country. This is what causes the shift in production to occur primarily during recessions and leads to the emergence of jobless recoveries. Essentially, recessions are "cheap" times to reallocate resources across countries.

I show that falling production of the consumption good in the advanced economy does not coincide with falling GDP. Thus, with no adjustment costs, the model produces increasing GDP and falling labor and labor productivity rises as factors are reallocated. With adjustment costs, recessions are a time when the firm is willing to pay to adjust, shifting resources to the more efficient production location. Therefore, the model produces large and sustained drops in labor in the advanced economy following a recession, while GDP recovers as the emerging market grows. Thus, the model is able to produce a jobless recovery.

Additionally, the model is consistent with increasing income inequality across individuals

\(^1\)Similar to those proposed by Burstein and Monge-Naranjo (2007)
in the advanced economy. This is due, in part, to a decrease in labor demand for the low-skilled households in the economy. It is also because labor by the high-skilled households become relatively more valuable as productivity in the emerging market grows.

The results suggest that the mechanism that I propose shows potential to be able to account for both the secular trends and the business cycle anomalies that have arisen in the past 20 to 25 years. In future work, I will calibrate the model in order to assess what share of job losses can be accounted for by the proposed mechanism.

**Related Literature**

This paper is most closely related to the recent work of Jaimovich and Siu (2012). They hypothesize that jobless recoveries can be tied to the recent reduction in routine jobs in the economy and increased concentration of employment in the tails of the occupational skills distribution. They show that the vast majority of the shift in the occupational distribution occurs around and during the three recessions and recoveries are jobless. Following the literature on job polarization, they attribute the drop in employment in jobs that predominately rely on routine skills to technological change which is skill- or routine-biased. I propose a different mechanism for the shift in the labor composition of employment. As has been recognized in several empirical studies, routine jobs are also those that can be easily offshored. I see my work as complementary to that of Jaimovich and Siu, who recognize that there is a role for offshoring and outsourcing in the job polarization literature, but fail to explore it. Moreover, they fail to provide evidence for the mechanism they do explore. In this paper, I show that increased import competition is associated with decreased job creation, suggesting that international forces should be important in accounting for both trend and cycle declines in employment.

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3 See, for example, Ebenstein et al (2009), Goos et al (2009), and Liu and Treffer (2011)
My paper is further related to two strands of literature. The first is a growing literature that explores the jobless recovery phenomenon. Bachmann (2009) offers an increase in labor hoarding as an explanation for jobless recoveries. According to this theory, when firms retain redundant works during downturns, hiring is weak during the subsequent recovery. This theory implies, counter factually, that the recent recoveries should be associated with increasingly procyclical labor productivity. Relatedly, Berger (2012) builds a model in which firms use recessions as opportunities to streamline their workforce. He argues that firms are more able to do this in the recent past due to the decline of union power. While Berger is able to generate weak labor recoveries and acyclical labor productivity, his paper suggest, counter factually, that the pattern of joblessness arises from increased job destruction rates. The data show that, while job losses certainly increase around recessions, jobless recoveries are related to low job creation rates. He relies on firms growing “fat” in good times, or booms, and shedding some of the inefficiencies during recessions. The mechanism that I propose is able to generate acyclical labor productivity and weak job creation after recessions. Garin, Pries, and Sims (2011) present a theory in which the Great Moderation and jobless recoveries are related. They hypothesize that reallocation shocks are have become relatively more important than aggregate shocks. Therefore, recent recoveries have been marked times of reallocation. They are able to replicate the qualitative changes in business cycles, but they do not offer an explanation as to why reallocation shocks have grown in importance. My work is complementary to theirs in that it offers a more micro-founded explanation of this phenomenon.

The second of strand of literature to which this paper contributes is the theoretical literature on job market impacts of increasing trade and international competition. I draw upon the observations of Autor, Dorn, and Hanson (2011). They show that increased competition from China, in the form of imported goods, can account for a large portion of the decline in U.S. manufacturing employment. Rising import exposure increases unemployment and low-
ers labor force participation. They concentrate on an empirical exploration of the downward trend from 1990 to 2007, while I offer a reason that this trend exists, as well as tie the trend to jobless recoveries. In a related paper, Kondo (2012) uses an alternate measure of import competition, finding larger impacts on the broader labor market, not just the market for manufacturing employees. He finds that, in addition to reducing unemployment and labor force participation, increased import competition is associated with lower job creation rates and high job destruction rates. To my knowledge, I am the first to consider the business cycle effects of increased globalization on labor markets.

The rest of the paper is organized as follows. Section 2 provides empirical evidence for the existence of jobless recoveries as part of a larger downward trend in employment relative to population. It then provides a link between this observation and increased globalization. Section 3 lays out the model. Section 4 provides a simplification of the model and illustrates the impacts of increased growth in low-income countries on advanced countries. In Section 5, I conduct a quantitative experiment to demonstrate that the model produces jobless recoveries and, in Section 6, I discuss calibration and steps for further research. Section 7 concludes.

2 Empirical Evidence

In this section, I first document the existence of jobless recoveries. I also offer some evidence about how overall employment and the employment to population ratio have been impacted by the drastic fall in manufacturing employment. I then turn to evidence of increased productivity in emerging markets and their relative importance in the global economy. Finally, I show some evidence that these two sets of facts are related.
2.1 Labor Market Data

In Figure 1, I plot total non-farm employees from the Establishment Survey from 1960 to 2012. The figure displays log deviations from a linear trend. Notably, after the two most recent recessions, employment has not recovered to its pre-recession peak. Additionally, in the recovery after the 1991 recession, employment recovered at a much slower rate than is exhibited in the previous recessions.

![Figure 1: Deviations from Linear Trend](image)

This can be seen more clearly in Figure 2. Table 1 shows the length (in months) of recovery from three early post-war and the three most recent recessions. It is measured in months from the trough of the business cycle, as dated by the NBER. So, in each of these recoveries, GDP began to recover in zero months. The first row shows a marked increase in the number of months it takes for growth in employment markets to begin. The second row reiterates the point, showing that labor markets take even longer to return to the level that they were at when GDP hit its trough. Note that the second row does not count the...
number of months it takes for employment to reach its cyclical peak. Rather, it counts the number of months it takes for employment to rebound to a level that it was at when GDP began to exhibit positive growth.

![Figure 2: Employment relative to Trough](image)

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn-around</td>
<td>1, 2, 1</td>
<td>18, 23, 15</td>
</tr>
<tr>
<td>Return to Trough</td>
<td>2, 2, 4</td>
<td>15, 55, 21</td>
</tr>
</tbody>
</table>

Table 1: Measures of Recovery

As Figure 3 shows, the employment to population ratio has not recovered from its 2001 pre-recession peak. Much of the fall in employment (and therefore, the employment to population ratio) can be attributed to a substantial drop in manufacturing employment. From 2001 to 2011, manufacturing employment fell from about 17 million employees to just under 12 million. (See Figure 4). Figures 5 and 6 highlight the importance of the decrease in employment in manufacturing. In these counterfactuals, I set manufacturing employment to it’s 1991 level (18 million employees) from 1991 to 2012. In each figure, the blue line is
the data and the red line is the counterfactual experiment. In all three of the most recent recoveries, employment growth would have been much faster had manufacturing employment not dropped so severely. Moreover, the employment to population ratio would have recovered after the 2001 recession and would currently be about four percentage points higher than it is in the data. Obviously, this is not an entirely clean exercise, as some of the workers who lost their manufacturing jobs have found jobs in other sectors of the economy. However, it does serve to illustrate the importance of the decline in manufacturing activity in the U.S.

Figure 3: Employment to Population Ratio

2.2 Emerging Market Data

In this section, I present evidence of the growing importance of emerging markets. First, I show evidence that these countries are “catching up” to their advanced counterparts, in terms of share of world GDP. I then provide evidence that the U.S. economy is more exposed to this competition, both through increased trade and through offshoring opportunities. In particular, U.S. companies (multinationals) have responded by expanding more heavily in
Figure 4: Manufacturing Employees

Figure 5: Counterfactual: Employees
developing countries than developed ones.

Figure 7 shows the share of GDP accounted for by advanced versus non-advanced countries. The data is from the World Bank’s World Development Indicators database. I hold the set of advanced countries fixed over the entire time period. It is notable that in 2000, the share of world GDP accounted for by non-advanced countries began to grow. By 2011, the share of world GDP accounted for by non-advanced countries was almost equal to that of the advanced countries. Most of this shift can be attributed to the emergence of China and its spectacular growth after it joined the World Trade organization in late 2002.

Figures 8 and 9 show the trends in multinational employment. In Figure 8, I plot the log of the number of employees of U.S.-based multinational companies employed in the U.S., in other advanced countries, and in developing countries.\footnote{Data from the BEA’s Direct Investment and Multinational Companies (MNCs) database} Figure 9 normalizes the number of employees in 1990 to 100 in order to show the growth in employment in the three areas. Total employment in multinationals has grown over time, but domestic growth has been almost
Figure 7: Share of per capita World GDP

flat. Similarly, employment in other advanced economies has grown, but only by about 20% over two decades. Employment in emerging markets, on the other hand, has surged, growing by about 280% over the same period. The share of employees in emerging markets began to grow particularly quickly in 2002, as manufacturing employment in the U.S. began to fall off substantially.

I turn now to imports from developing countries. It has been documented elsewhere\(^5\) that in 1991 the low-income country share of U.S. manufacturing imports only accounted for 2.9% of U.S. manufacturing imports. In 2007, they accounted for 11.7%. Imports from China account for over 90% of the total growth in low-income country imports. Moreover, total U.S. spending on Chinese goods grew by almost 700% over the same period.

Figure 10 shows the U.S. trade balance. Clearly, during the period in which we observe a secular drop in manufacturing employment is a period of increased trade and competition. Figure 11 reiterates that much of this growth in trade can be accounted for by growth in

\(^5\)See, for example, Autor, Dorn, and Hanson (2011)
trade with low-income countries.
2.3 Increased Globalization and Labor Market Outcomes

Here, I offer evidence that the trend and cyclical changes in labor market outcomes are related to increased globalization and competition from low-income countries. Autor, Dorn, and
Hanson (2011) find that about one quarter of the secular drop in manufacturing employment can be accounted for by increased import competition. In a complementary paper, Kondo (2012) extends their work using a different measure of import competition. Furthermore, he considers additional labor market variables, including job creation and destruction. In what follows, I replicate the results in Kondo (2012).

As a measure of import competition, I workers who have been certified to receive Federal TAA (Trade Adjustment Assistance) benefits, as a fraction of working age population. There is substantial variety in this measure across state and years which can be exploited to identify differences in employment rates and job creation and destruction rates. I calculate employment status and weeks unemployed from the Current Population Survey. Job destruction and creation rates are constructed using the Business Dynamics Statistics database and the definitions of Davis, Haltiwanger, and Schuh (1998). Table 2 reports the results of the following regression:

\[ \text{dependent variable}_t = \alpha + \beta \times \text{import competition}_t + \gamma \times \text{controls}_t + \text{error}_t \]

These regressions show that increased import competition is associated with lower rates of employment and labor force participation, high job destruction, and lower job creation. Higher destruction rates and lower creation rates clearly lead to a secular decrease in employment. Moreover, the results show that increased import competition results in longer unemployment spells. Therefore, we can say that these results support that hypothesis.

There is clearly an endogeneity issue in the regressions above since the measure of import competition being used is essentially a measure of unemployment insurance. Therefore, in future work, I will exploit the method of Autor, Dorn, and Hanson (2011) to instrument for import competition. Additionally, more work needs to be done to relate import competition to business cycle frequency indicators. In particular, I am exploring how months to recovery vary across states, recessions, and industries with increased import competition.
<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Import Competition</th>
<th>$R^2$</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Employed</td>
<td>3.35* (0.78)</td>
<td>0.86</td>
<td>1350</td>
</tr>
<tr>
<td>Not in Labor Force</td>
<td>2.19* (0.86)</td>
<td>0.86</td>
<td>1350</td>
</tr>
<tr>
<td>Weeks Unemployed</td>
<td>0.51* (0.15)</td>
<td>0.54</td>
<td>1350</td>
</tr>
<tr>
<td>Job Destruction Rate</td>
<td>1.82* (0.72)</td>
<td>0.80</td>
<td>1350</td>
</tr>
<tr>
<td>Job Creation Rate</td>
<td>-1.276* (0.63)</td>
<td>0.77</td>
<td>1350</td>
</tr>
</tbody>
</table>

Table 2: Labor Market Outcomes and Import Competition

3 Model

In this section, I develop a modified growth model in which growth in an emerging country can lead to jobless recoveries in the advanced country. I first describe the problem solved by the firm (the multinational) and then the problem solved by the two types of households.

3.1 The Environment

Time is discrete and infinite. There are two countries: Advanced (A) and Emerging (E). In Country A, there are two types of households, whereas in Country E, there is only one type of household. Each household consumes a single consumption good and saves with a one-period bond. Households of type “M” operate a linear backyard technology in order to produce managerial services, which they then rent to the firm. These services can be used in either country but are produced only in Country A. Type-L households live in both countries and rent labor services to the firm’s production facility in the country where they reside. The proportion of type-M to type-L households in Country A is fixed at $\frac{\alpha}{1-\alpha}$. The single consumption good is produced by a multinational firm, which is headquartered in Country A. This firm can choose production locations. It will rent labor from the household
that is located in the country of production. The two countries differ in their productivities. Country A is more productive than Country E at \( t = 0 \) but has zero growth, whereas Country E’s productivity grows deterministically over time.

### 3.2 The Multinational

The multinational operating in Country \( i \) produces output \((y^i_t)\) at time \( t \) using labor \((l^i_t)\) and managerial “know-how” or services \((m^i_t)\)

\[
y^i_t = z^i_t (m^i_t)^\theta (l^i_t)^\nu
\]

where

\[
\theta + \nu \leq 1
\]

Managerial services are rented from M-type households in Country A and may be reallocated by the multinational across countries. Denote by \( m^i_t \) the amount of managerial services that are used in country \( i \) and by \( m_t \) the total amount of managerial services hired by the firm, which will be the sum of \( m^A_t \) and \( m^E_t \). Notice that managerial services are mobile across borders, but labor is not. The term \( z^i_t \) is country-specific productivity. The multinational will face productivity processes whose growth vary across countries. In particular,

\[
\begin{align*}
z^A_0 & > z^E_0 \\
z^A_t &= z^A_0, \quad \forall t \\
z^E_t &= \rho^A z^E_0 + (1 - \rho^A) z^A_0
\end{align*}
\]

The multinational pays a local wage to laborers \((w^i_{L,t})\). The rent paid to managerial services will be the same, no matter where the managerial services are used since they are
all produced in Country A. The multinational pays a fixed cost of adjusting the level of managerial services in each country.

The multinational firm takes prices as given and maximizes the present value of dividends:

\[
\max_{m_t, m_t^A, m_t^E, l_t, l_t^A, l_t^E} \sum_t p_t D_t
\]

subject to

\[
D_t = d_t^A + d_t^E
\]

\[
d_t^i = y_t^i - w_{L,t} n_t^i - w_{M,t} m_t - \varphi_{m_t^i \neq m_{t-1}^i}
\]

\[
y_t^i = z_t^i (m_t^i)^\theta (l_t^i)^\nu
\]

### 3.3 Households

There are two types of households in the advanced economy: L-type households and M-type households. L-type households make up a fraction \(1 - \alpha\) of the total economy, where M-type households make up a fraction \(\alpha\). The emerging economy has only L-type households.

In each period, \(t\), the L-type household in country \(i\) receives labor income, \(w_{L,t}^i n_{L,t}^i\), earnings on his asset position, \((1 + r_{b,t})b_{L,t}^i\), and some fraction \(\phi_t^i\) of the total dividends of the firm \((D_t)\). He chooses consumption, \(c_{L,t}^i\), labor supply, \(n_{L,t}^i\), and asset position, \(b_{L,t+1}^i\). The maximization problem for the household is thus

\[
\max_{c_{L,t}^i, n_{L,t}^i, b_{L,t+1}^i} \sum_t \beta^t u \left( c_{L,t}^i - v(n_{L,t}^i) \right)
\]

subject to

\[
p_t(c_{L,t}^i + b_{L,t+1}^i) = p_t \left( w_{L,t}^i n_{L,t}^i + (1 + r_{b,t})b_{L,t}^i + \phi_t^i D_t \right)
\]
The household take all prices \((p_t, w^i_{L,t}, r_{b,t})\) as given.

The M-type household has access to a backyard linear technology which he operates in order to produce an intermediate good, “managerial services”, \(m_t\), which it sells to the firm at price \(w_{M,t}\). Its income is thus composed of rental income, \(w_{m,t} m_t\), earnings of the asset position, \((1 + r_{b,t})b_{M,t}\), and a fraction \(\phi_M\) of the firm’s dividend payments. It chooses consumption, \(c_{M,t}\), labor supply, \(n_{M,t}\), and asset position, \(b_{M,t+1}\). The maximization problem for the household is thus

\[
\max_{c_{M,t},n_{M,t},m_t,b_{M,t+1}} \sum_t \beta_t u \left( c_{M,t} - v(n_{M,t}) \right)
\]

subject to

\[
p_t(c_{M,t} + b_{M,t+1}) = p_t \left( w_{M,t} n_{M,t} + (1 + r_{b,t})b_{M,t} + \phi_M D_t \right)
\]

\[m_t = n_{M,t}\]

The household takes all prices \((p_t, w_{M,t}, r_{b,t})\) as given.

### 3.4 Competitive Equilibrium

A competitive equilibrium in this economy is a set of quantities \(\{d^i_t, y^i_t, m_t, m^i_t, n^i_{L,t}, c^i_{L,t}, c^i_{M,t}, b^i_{L,t}, b^i_{M,t}\}_{i \in \{A,E\}}\) and prices \(\{p_t, r_{b,t}, w^i_{L,t}, w_{M,t}\}\), that are consistent with

1. the firm’s maximization problem,
2. the household maximization problems,
3. managerial services market clearing,

\[m_t = m^A_t + m^E_t\]
4. labor market clearing in each country $i$,

$$l^i_t = n^i_{L,t}$$

5. bond market clearing,

$$\sum_{i \in \{A,E\}} b^i_{L,t} + b_{M,t} = 0$$

6. the aggregate resource constraint

$$\sum_i c^i_{L,t} + c_{M,t} = \sum_i y^i_t$$

4 Effects of Increasing Productivity in Country E: Secular Decrease in Labor

In this section, I explore the qualitative effects of an increase in the productivity of the emerging market, relative to that of the advanced economy. I want to show that, under certain conditions, growth in Country $E$ causes labor in Country $A$ to fall, while GDP in that country rises.

4.1 Simplified Model: Abstracting from Adjustment Costs

For the moment, let us abstract from adjustment costs in order to explore the impact of growth in the developing country in a clear way. In this case, the firm is solving

$$\max_{m_t, m^A_t, m^E_t, t^A_t, t^E_t} \sum_t p_t D_t$$
subject to

\[ D_t = d_t^A + d_t^E \]
\[ d_t^i = y_t^i - w_{L,t}^i d_t^i - w_{M,t} m_t \]
\[ y_t^i = z_t^i (m_t^i)^\theta (l_t^i)^\nu \]

Let’s further assume that the household has preferences that are linear in consumption and take the form

\[ u(c - v(n)) = c - \frac{n^{1+\gamma}}{1 + \gamma} \]

Assuming that \( p_0 = 1 \), the household’s problem yields first order equations

\[ w_{L,t}^i = (n_{L,t}^i)^\gamma \]
\[ w_{M,t} = (n_{M,t})^\gamma \]
\[ (1 + r_{b,t}) = \frac{1}{\beta} \]
\[ p_t = \beta^t \]

Assume that \( \theta = 1 - \nu \). Then, the firm’s problem yields first order conditions:

\[ w_{L,t}^A = \nu z_t^A \left( \frac{m_t^A}{n_t^A} \right)^{1-\nu} \]
\[ w_{L,t}^E = \nu z_t^E \left( \frac{m_t^E}{n_t^E} \right)^{1-\nu} \]
\[ w_{M,t} = (1 - \nu) z_t^E (m_t^E)^{-\nu} (n_t^E)^\nu \]
\[ (1 - \nu) z_t^E (m_t^E)^{-\nu} (n_t^E)^\nu = (1 - \nu) z_t^A (m_t^A)^{-\nu} (n_t^A)^\nu \]
Substituting the equilibrium condition

\[ m_t^E = m_t - m_t^A \]

into the firm’s first order conditions and the household conditions yields two equations and two unknowns which characterize the equilibrium:

\[
m_t^A = \left( \frac{z_t^A}{z_t^E} \right)^{\frac{\gamma+1}{\gamma\nu}} (m_t - m_t^A) \\
m_t = \left[ (1 - \nu)\nu^{\frac{\nu}{\gamma - \nu + 1}} (z_t^A)^{\frac{\gamma+1}{\gamma}} \right]^{\frac{1}{\gamma}} (m_t^A)^{\frac{1}{\gamma - \nu + 1}}
\]

I can then solve for \( m_t \) and \( m_t^A \) in terms of fundamentals. First, denote

\[
\tilde{z} = \left( \frac{z_t^A}{z_t^E} \right)^{\frac{\gamma+1}{\gamma\nu}}
\]

Then,

\[
m_t^A = \left( \frac{\tilde{z}}{1 + \tilde{z}} \right)^{\frac{\gamma}{\gamma + 1}} \left( (1 - \nu)\nu^{\frac{\nu}{\gamma - \nu + 1}} (z_t^A)^{\frac{1}{\gamma}} \right) \left( z_t^A \right)^{\frac{1}{\gamma - \nu + 1}}
\]

\[
m_t = \left( \frac{\tilde{z}}{1 + \tilde{z}} \right)^{\frac{\nu}{\gamma + 1}} \left( (1 - \nu)\nu^{\frac{\nu}{\gamma - \nu + 1}} (z_t^A)^{\frac{1}{\gamma}} \right) \left( z_t^A \right)^{\frac{1}{\gamma - \nu + 1}}
\]

I would like to see whether there exists a set of parameters under which growth in the developing country causes GDP in the advanced country to rise, while labor in that country falls. Note that gross domestic product (\( GDP_t^A \)) and aggregate labor (\( L_t^A \)) can be written:

\[
GDP_t^A = \alpha w_{M,t} m_t + (1 - \alpha) w_{L,t}^A n_{L,t}^A
\]

\[
L_t^A = \alpha n_{M,t} + (1 - \alpha) n_{L,t}^A
\]
Since \( w_{M,t} = \gamma_{M,t} \) and \( w_{L,t}^A = (n_{L,t}^A)^\gamma \), GDP can be re-written:

\[
GDP_t^A = \alpha m_t^{\gamma+1} + (1 - \alpha)(n_{L,t}^A)^{\gamma+1}
\]

I must, therefore, express \( n_t^A \) as a function of fundamentals.

\[
n_t^A = \left( \frac{\bar{z}}{1 + \bar{z}} \right)^{\frac{1 - \nu}{\gamma + 1}} \left( (1 - \nu)^{1 - \nu} \nu \frac{1 - \nu}{\gamma - \nu + 1} \right) \left( \frac{\bar{z}}{1 + \bar{z}} \right)^{\frac{\gamma + 1}{\gamma - \nu + 1}} \left( \frac{\bar{z}}{1 + \bar{z}} \right)^{\frac{1}{\gamma - \nu + 1}} (z_t^A)^{\frac{1}{\gamma}}
\]

Plugging in for \( m_t, m_t^A, \) and \( n_t^A \), I can express \( GDP_t^A \) and \( L_t^A \) in terms of fundamentals.

\[
GDP_t^A = (z_t^A)^{\frac{1}{\gamma}} \left( \frac{\bar{z}}{1 + \bar{z}} \right)^{\frac{1 - \nu}{\gamma - \nu + 1}} \left( (1 - \alpha)(1 - \nu) \nu^{\frac{1 - \nu}{\gamma - \nu + 1}} \left( \frac{\bar{z}}{1 + \bar{z}} \right)^{\frac{\gamma + 1}{\gamma - \nu + 1}} \left( \frac{z_t^A}{z_E^A} \right)^{\frac{\gamma + 1}{\gamma - \nu + 1}} \right) + \alpha(1 - \nu)^{\frac{\gamma - \nu + 1}{\gamma}} \nu^{\frac{\nu}{\gamma}}
\]

\[
L_t^A = (z_t^A)^{\frac{\gamma + 1}{\gamma}} \left( \frac{\bar{z}}{1 + \bar{z}} \right)^{\frac{1 - \nu}{\gamma - \nu + 1}} \left( (1 - \alpha)(1 - \nu) \nu^{\frac{1 - \nu}{\gamma - \nu + 1}} \left( \frac{\bar{z}}{1 + \bar{z}} \right)^{\frac{\gamma + 1}{\gamma - \nu + 1}} \left( \frac{z_t^A}{z_E^A} \right)^{\frac{\gamma + 1}{\gamma - \nu + 1}} \right) + \alpha(1 - \nu)^{\frac{\gamma - \nu + 1}{\gamma - \nu + 1}} \nu^{\frac{\nu}{\gamma}}
\]

I want to examine what happens when \( z_E \) grows but \( z_t^A \) does not. In order to do this, I take derivatives of \( GDP_t^A \) and \( L_t^A \) with respect to \( z_E \). In this environment, I get \( GDP_t^A \) rising while labor, \( L_t^A \), is falling if the following two inequalities are satisfied.

\[
\alpha(1 - \nu) \nu^{\frac{\nu}{\gamma}} > \frac{(1 - \alpha)(1 + \gamma) \nu^{\frac{1 - \nu}{\gamma - \nu + 1}} \left( \gamma + 1 \right)}{\gamma - \nu + 1} \left( \frac{z_t^A}{z_E^A} \right)^{\frac{\gamma + 1}{\gamma - \nu + 1}} \left( 1 + \left( \frac{z_t^A}{z_E^A} \right)^{\frac{\gamma + 1}{\gamma - \nu + 1}} \right)^{\frac{1}{\gamma - \nu + 1}}
\]

\[
\alpha(1 - \nu)^{\frac{1}{\gamma + 1}} \nu^{\frac{\nu}{\gamma(\gamma + 1)}} > \frac{1 - \alpha}{\gamma - \nu + 1} \nu^{\frac{1 - \nu}{\gamma(\gamma + 1)(\gamma - \nu + 1)}} \left( \gamma + 1 \right) \left( 1 + \left( \frac{z_t^A}{z_E^A} \right)^{\frac{\gamma + 1}{\gamma - \nu + 1}} \right)^{\frac{1}{\gamma - \nu + 1}}
\]

Here, I’m assuming that \( \nu \in [0, 1] \) and that \( \gamma > 0 \). These assumptions are innocuous given the interpretation of these parameters. The parameter \( \nu \) maps to labor’s share in the economy and \( \gamma \) is the disutility of labor.
4.2 Quantitative Exercise

I now turn to a quantitative exercise in which the above conditions are satisfied and show that, in the absence of adjustment costs, the model generates a trend decrease in labor, while GDP continues to grow. Table 3 reports the parameter values that were used in the quantitative exercise.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Governs</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\rho$</td>
<td>0.95</td>
<td>Growth in Country $E$</td>
</tr>
<tr>
<td>$\beta$</td>
<td>0.96</td>
<td>Household Discounting</td>
</tr>
<tr>
<td>$\gamma$</td>
<td>2</td>
<td>Disutility of labor</td>
</tr>
<tr>
<td>$\theta$</td>
<td>0.7</td>
<td>Service share</td>
</tr>
<tr>
<td>$\nu$</td>
<td>0.3</td>
<td>Labor Share</td>
</tr>
<tr>
<td>$\alpha$</td>
<td>0.5</td>
<td>Share of Managerial Households</td>
</tr>
<tr>
<td>$\varphi$</td>
<td>0</td>
<td>Fixed Cost of Adjustment</td>
</tr>
</tbody>
</table>

Table 3: Parameter Values

Figures 12, 13, and 14 show the model predictions in a frictionless economy for the above parameterization. Notice, in Figure 12, that GDP in the advanced economy grows, even as total labor in that economy falls. Managerial services become more valuable as more and more labor is used worldwide. In the background, productivity in the emerging country is rising, increasing demand for both $m_t^E$ and $n_t^E$. Since all managerial services are produced in the advanced country, GDP rises as a result for increasing world demand for managerial services. Figure 13 shows the change in equilibrium outcomes. Notice that $m_t$ is rising as $n_t^A$ is falling. Generating falling labor is essentially a horse race between these two forces. Mechanically, it must be the case that labor productivity is rising in this economy, since GDP is rising as labor is falling. Figure 14 shows that this is, indeed, the case.

Figure 15 shows the trade balance generated by the model, as a percentage of model GDP in country A. As in the data, the trade balance is falling as the emerging country grows. This observation can later be used in order to guide a more serious calibration.

In order for GDP to rise, it must be the case that total income in the economy is rising. It must be that wages for the L-type household in the advanced economy are falling since wages simply
equal \((n_t^A)^\gamma\) in equilibrium and that is falling. Therefore, the income of the low-skilled household is falling in the model. Then, income for the high-skilled household must be rising in order to generate overall growth in income in the economy. So, income dispersion increases as the emerging country grows and the world demands more labor inputs from the high-skill household and fewer labor
inputs from the low-skilled household in the advanced country. Therefore, as an added feature, the model generates rising income inequality.
5 Adding Adjustment Costs: Generating Jobless Recoveries

In this section, I allow for adjustment costs and explore whether the model can generate jobless recoveries, or sustained losses in employment accompanied by growth in GDP, via a negative productivity shock to $z^A$. I return to the model developed in Section 3, which features an adjustment cost that the firm must pay any time it changes $m^A_t$ or $m^E_t$. Therefore, even though Country E may be growing in the beginning, the firm may not want to pay the adjustment cost until $z^E$ grows sufficiently or $z^A$ falls sufficiently. It is well known that non-convex adjustment costs generate this zone of inactivity.

<table>
<thead>
<tr>
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<th>Governs</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Growth in Country E</td>
</tr>
<tr>
<td>$\beta$</td>
<td>0.96</td>
<td>Household Discounting</td>
</tr>
<tr>
<td>$\gamma$</td>
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<td>Disutility of labor</td>
</tr>
<tr>
<td>$\theta$</td>
<td>0.5</td>
<td>Service share</td>
</tr>
<tr>
<td>$\nu$</td>
<td>0.3</td>
<td>Labor Share</td>
</tr>
<tr>
<td>$\alpha$</td>
<td>0.5</td>
<td>Share of Managerial Households</td>
</tr>
<tr>
<td>$\phi$</td>
<td>0.05</td>
<td>Fixed Cost of Adjustment</td>
</tr>
</tbody>
</table>

Table 4: Parameter Values

I parameterize the model such that in a frictionless world, it would always be optimal to shift resources from Country A to Country E. I then set adjustment costs such that when productivity is sufficiently low in Country E, the firm will choose to maintain resources in Country A rather than pay the cost of adjustment. Table 4 shows the parameterization used in the simulations. I then conduct a simulation to see whether or not the model can generate jobless recoveries. The experiment is to allow growth in country E, as governed by the growth parameter $\rho$. Then, shock Country A with a one period negative productivity shock, equal to one percent productivity, and allow it to decay over ten periods.

Figures 16 through 18 show the results of this experiment. As expected, before the negative productivity shock in Country A, which occurs at period 0, the firm chooses not to reallocate workers. Once the negative shock occurs, the firm chooses to reduce the proportion of managers
used in Country A, $m_t^A$. This can best be seen in Figure 17. Here we can also see that the reduction in labor is still a horse race between increasing overall demand for managerial services (and thus $n_{M,t}$ since they are created using a linear technology) and falling demand for labor in Country A. During the recovery, we see stagnant labor markets, even as GDP is increasing. In this sense, the model is able to qualitatively match the features of a jobless recovery. Moreover, as Figure 18 shows, labor productivity falls initially, but recovers very quickly. In fact, labor productivity is growing even as labor inputs are stagnant or even falling. This is a feature of recent recessions which is puzzling in the context of a standard RBC model. However, in the context of a simple growth model with asymmetric growth, I am able to generate this feature.

Figure 16: GDP and Labor

Figure 19 shows the predictions of the model for trade. The model (counterfactually) predicts that imports should increase, causing the trade balance to fall, over the course of the recession. In fact, it predicts a large drop in the trade balance just as the negative productivity shock hits Country A. This is because reallocation occurs during this period, causing more consumption goods to be produced in Country E. Perfect risk-sharing implies that households in Country A simply borrow in order to continue to consume these goods when their income falls during the recession.
Overall, the model is able to produce the desired features. It certainly has some limitations, but this section shows that the proposed mechanism is a promising one in being able to account for jobless recoveries. In the next section, I discuss what additional steps need to be taken in order to quantify the impact of the mechanism.
6 Calibration and Future Work

Sections 4 and 5 illustrate that globalization shows promise in terms of helping to account for the recent observed changes in labor market outcomes. In order to more fully assess the model’s ability to account for jobless recoveries, it will be necessary to use a more seriously calibrated model.

As explored in Section 4, the parameters that are important for the results are the labor and managerial shares ($\nu$ and $\theta$), the disutility of labor ($\gamma$), and the share of each type of household ($\alpha$). In the current version of the paper, I use a standard value for measured labor share, $\nu$, and have set managerial share, $\theta$, guided by financial and operating data of multinationals from the BEA. MNCs also provide data that divides employees into job functions and provides data on their compensation. Using this, I can back out the managerial and labor shares for the types of companies I have in mind. In order to match the disutility of labor, $\gamma$, I will match the average hours worked by households, calculated using the Current Population Survey (CPS). I will need to assume a number of discretionary hours available to a household and then I will match the fraction of that time spent working. The share of each type of household in the economy, $\alpha$, can
also be inputed from the CPS. I can define M-type households as those that have a certain level of education. Then, I can calculate $\alpha$ directly from the CPS.

The other parameter that will be very important is that that governs adjustment costs, $\phi$. In my numerical example above, results are somewhat sensitive to this parameter. It is not possible to measure adjustment costs in the data, since many of the things we think of as causing adjustment to be costly are intangible. For example, the time cost to hiring a manager is an adjustment cost and this is difficult to measure. Moreover, it is difficult to make the case that the cost of hiring a manager to work in the U.S. is the same as the cost of training that manager to go work in China. In order to calibrate this parameter, I plan to close the economy and try to match business adjustments in the pre-1990 period. This will give me a lower bound on what adjustment costs should be since the cost of shifting managerial services to another country should be higher than the cost of hiring an extra manager to work in the U.S. Therefore, a calibration of this sort will give me a lower bound on the share of jobless recoveries that can be accounted for by the mechanism.

I will also need to choose a growth path for $z^E$. I will use the trend growth in MNC employment in low-income countries in order to discipline this. This will allow me to match hiring trends by construction. Taking those as given, I will be able to then see if these trends can account for jobless recoveries.

In terms of my empirical work, I have applied to use firm-level data from the BEA in order to see whether multinational firms choose to expand more into countries with high growth rates. This could help to support the main idea behind the model. I also am working on the aforementioned extension of Autor, Dorn, and Hanson (2011). Although this is not directly related to the model that I have written down, it will help guide an extension that I have mind.

In future work, I would like to incorporate another type of firm into the economy in order to consider the trade channel as well. I also think it would be interesting to explore the idea that firms may be shifting resources to the emerging country in order to serve the local market in these countries. In this set up, companies again would wait until reallocation is cheap in order to shift resources. I think with this added idea, I might be able to capture the drop in trade flows that
occurs around recessions while still capturing a drop in employment.

7 Conclusion

In this paper, I construct a model with decreasing cross-country productivity differences in order to explore whether international reallocation contributes to slower labor recoveries in advanced economies. I find that a simple growth model with multinational corporations, asymmetric growth, and adjustment costs is able to generate both a secular decline in the employment to population ratio and a concentration in that decline around recessions, leading to jobless recoveries. Additionally, I show some empirical evidence that the elements that I include in the model are supported by the data.

From a policy perspective, it is important to understand the contributing sources of jobless recoveries. The policy implications might be very different if jobless recoveries arise due to skill-biased technical change than if the root cause of jobless recoveries is increased globalization and competition from emerging markets. The model I have build is a promising step towards quantifying the impact that globalization has had upon the changing business cycle properties of labor markets. This, in turn, can guide policy discussions about the role of globalization in supporting economic growth and its distributional consequences. The model predicts that with GDP growth comes growing inequality. From a welfare perspective, it’s not clear what the policy implication of this finding might be. Therefore, a more realistic calibration is an important next step to conducting policy analysis.
References


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