Envisioning the Impact of the Belt and Road Initiative on Regional Labor Markets

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Abstract: Using trade and labor-force data of the western provinces from 1994, this study empirically proved the existence of a long-running equilibrium between foreign trade and labor size in western China. By constructing a vector autoregressive model, the results show that the “opening toward the west” policy increased western China’s import and export, both of which attracted an inflow of labor force. After analyzing the numerical effect, a Shift-Share Analysis (SSA) and an analysis of the deviation degree of industrial structure are conducted, to measure the possible structural changes in the labor force. We find that manufacturing in the western provinces is comparatively more advantageous than manufacturing at the national level, which theoretically calls for a huge labor demand. Agriculture presents a contrasting result. This result is consistent with the results of the deviation degree analysis. In conclusion, the Belt and Road Initiative (BRI) has changed the trade patterns, and it has enhanced the comparative advantages of western China and it is expected to bring about changes in both the number and the structure of the local labor force, and it provides new impetus for the region’s development.

Keywords: Belt and Road Initiative; western China; labor mobility; regional development

1. Introduction

The Belt and Road Initiative (BRI) proposed by China is a large socioeconomic and geographic project across countries and continents, which aims to explore the possibility of connecting China to different parts of the world, in order to promote trade and communication, and exchanges of experiences of development [1]. Given the large magnitude of cooperation that is required, and the complex situations in various economic and cultural contexts, the international community has mixed views about this initiative [2]. As a major commitment of the initiative, investment and trade are predicted to attract ample attention [3], which may create the potential for regional cooperation and development, especially in parts that were relatively forgotten in the previous round of economic globalization, such as central Asia. Also, the BRI is a way for China to sustain its economic growth, by exploring new forms of international economic cooperation with new partners, bringing with it new opportunities for relatively less developed regions; for instance, western China [4]. Aiming for sustainable development across regions, the win–win cooperation narrowed the gap among neighboring countries and achieved mutual development. However, there are few studies that have examined the (potential) impacts of the BRI on regional economic development.

With the progress of BRI, the external economic environment changes in a region. Policy design and research capture this, primarily by considering economic openness, trade, or the degree of foreign investment. For instance, Song, Che, and Yang (2018) [5] examine the topological relationship between...
the BRI and global trade networks and the key actors in these networks. Z. Liu, Wang, Sonn, and Chen (2018) examine the structure and changes in trade relations networks with the development of the BRI [6]. Kang, Peng, Zhu, and Pan (2018) investigate the influence of the BRI on China’s outward foreign direct investment [7]. These investigations show the external economic environment of a region under transformation. However, limited knowledge has been generated about the changes in the key development indicators (such as labor) within the region undergoing such transformation [8], which may contribute to a deeper understanding of the regional impacts and equip regional policy makers to actively participate in and enjoy the benefits of the BRI.

In view of this, this study aimed to investigate the impact of the changes in foreign trade on the economic development of western China, following the promotion of the BRI. The purpose was to provide a stylized analytical framework that was related to the influence of the BRI on regional economic development. Since the BRI is still in its “infancy,” this study constructed a VAR (Vector Autoregressive Model) model with data from the past 20 years, to establish a general relationship between foreign trade and labor size in the western regions. The international trade also contributes to the long-term sustainability of employment and wages in the labor market, and it changes the skewed labor distribution among regions (FDI has mainly flowed to eastern coastal China during the last 40 years; this initiative could change the situation to western China’s advantage) [9]. Next, a trend extrapolation method was applied to measure the impacts of foreign trade on employment structure. On the basis of the aforementioned analyses, the economic competitiveness of each province was evaluated, to further demonstrate the actual benefits that western provinces and regions receive, following the implementation of the BRI. In summary, this paper will assist in understanding the regional economies from the dynamic perspective of the labor market, provide an innovative perspective in policy evaluation, and set up a quantitative observation method for analyzing the impacts of the BRI on the western region, as well as on other areas. Although lacking directly related data and reference cases, we hope to provide useful recommendations for potential impacts, by envisioning the potential impacts that are based on the analysis of the workforce, and to advise on the future direction of the BRI.

2. Foreign Trade and Changes in the Regional Labor Market

2.1. Changes in Regional Labor Force under the Trade

The implementation of the BRI has formed an economic and trade cooperation network that covers neighboring countries in Central and Southeast Asia. Experiences have shown the positive role of foreign trade in the economic growth and industrial structure optimization of the Four Asian Dragons (the economies of Hong Kong, Singapore, South Korea, and Taiwan) [10], increase in employment [11]. The central and western regions in China are the key targets of construction and investment in the BRI, and therefore are expected to gain in the growth of foreign trade. Since the implementation of the initiative, the scale of bilateral trade between China and countries along the Road has grown rapidly. In the first half of 2015, the total import and export volume of China and the countries along the Road reached 3 trillion yuan, accounting for one-quarter of the total trade for the same period [12].

Trade will affect labor force in several different ways. The greater degree of openness and trade liberalization would be linked to labor demand elasticity and technological progress, which would bring labor change [13]. Trade can also bring labor demand by increasing expected income of labor to promote mobility. A study measuring dynamic labor market adjustment of trade shock using welfare analysis found that workers were better off after trade liberalization because of the increase of option value [14]. Other studies have analyzed the influence of trade liberalization, using wage inequality [15,16], labor adjustment costs [17], and so on. In this paper, we mainly concentrate on the size and structure of labor.

The size of the labor force is an important indicator of the wealth of a regional economy [18]. Classical economics theories highlight that economic development is mainly determined by the combined influences of capital and labor, and that the quantity of labor is an input factor that affects
future economic growth in a given region [19]. Observing changes in the labor-force size is of great significance for a dynamic assessment of the future prosperity of a regional economy. An enhancement in the quality of labor is believed to further promote economic growth by affecting the industrial structure and the knowledge effect [20]. The stability of labor structure is directly associated with the stabilization of the industrial structure, business structure, and the development trends of a region [21]. In addition, the accumulation of specialized talent greatly drives the development of related industries [22]. Therefore, the development of foreign trade in the western regions following the implementation of BRI is believed to affect the composition of the local labor force. So, a study of the labor-force size of a region is conducive for assessing and forecasting its regional economic dynamics.

In addition, inter-regional trade is closely linked to industrial structure. Industrial structure can be a very important determinant of the welfare effects of trade expansion [23]. The influence of foreign trade on industrial structure is mainly reflected in the driving and optimization effects of foreign trade, industrial transfers, and business cycles. In addition, market demand becomes an important link between foreign trade structure and industrial structure [24]. Under the influence of foreign trade, a change in industrial structure is a key factor for corresponding changes in the labor market.

This process can be analyzed from both the size and the structure of the labor force. Studies have revealed that dependence on foreign trade has a significant impact on the number of people employed [25]. The expansion of market demand leads to an increase in demand for labor; as a result, expected income raises, geographic wage difference, and search for a better locational match all drive labor to mobile [26]. Hence, export trade promotes employment, while import trade inhibits employment [27]. According to existing research, from 2008 to 2012, China’s export industry generated an average of 9.6 million jobs per year, while the import industry cut 210,000 jobs [28]. In studying trade-induced transitional dynamics in the Brazilian labor market, there was found to be a large labor market response following trade liberalization (though taking years) with potential variation in welfare [29]. When focusing on different sectors, the effect of trade on wages varies among sectors in both the short and the long run, which is an important factor of labor mobility, and thus the employment among sectors varies. It has been shown that the impact of foreign trade on employment tends to gradually shift from affecting the expansion of the market to affecting the structure of employment; changes in the industrial structure also have a significant impact on the regional employment structure [30].

In addition, the labor market in China presents a noticeable pendulum effect. Specifically, when the western regions change the industrial structure through import and export trade and introduce more labor into the local market, the local labor structure changes, and thus generates a force for regional development [31]. The upgrading of trade structure has led to an increase in the proportion of skilled labor on an annual basis, which is conducive to the optimization of the employment structure. Some scholars have suggested that, based on Engel’s law and sector-biased technological progress, foreign trade is likely to cause U-shaped changes in the proportion of employment in manufacturing (rising first and followed by falling), while the proportion of employment in the service industries is expected to gradually increase [32]. From 1994 to 2009, China’s import and export trade caused the labor force to flow out of agriculture and toward manufacturing and services [33]. Therefore, this study attempts to explore foreign trade and the economic development dynamics of western China from the perspectives of the size and the structure of labor.

2.2. Changes in the Trade Structure of Western China with the Implementation of the BRI

Since the implementation of the BRI, China has continually strengthened cooperation with countries along the Road. The trade volume of countries along the Road accounted for 21.7% of the world’s total trade volume. The sum of the GDP (Gross Domestic Product) of the 64 countries along the Road is forecast to be USD 12.0 trillion, with a total foreign trade of USD 7,188.55 billion, accounting for 21.7% of the total global trade [34]. From 2003 to 2017, the import and export volume of goods in western China increased. The proportion of imports and exports gradually increased. In 2017,
export and import in the western regions accounted for 7.9% and 7.1% of the country’s total export and import volume, respectively (Figure 1). This appears to be the ideal timing for industrial structure optimization in the western regions.

Figure 1. Proportion of the domestic goods that the western region accounts for. Source of data: Database of National Bureau of Statistics of China, figure drawn by the authors.

With the gradual adjustment of the industrial structure, the western regions are now facing an emerging unemployment problem. Employment and industrial structure are ill-fitted and the proportion of non-agricultural employment is low. Specifically, there is a surplus of labor in the primary industries and a shortage of labor in the manufacturing and services. The ill-fitted labor force is likely to result in a push and pull effect on labor resources, which ultimately may lead to changes in the labor market. Therefore, studying the changes in the labor structure is highly significant to further promote the BRI and aid preparation for a new trend of foreign trade.

3. Methodology

3.1. Methods

Changes in labor force are affected by the different stages of economic growth, and they are closely related to economic factors such as real wages, price levels, and opportunity costs. They are also an important indicator of adjustments in the local economy. The condition of the labor force is one of the foundations of economic development; the size and structure of the labor force have a direct impact on the local economy. Therefore, the size and structure of the labor force serve as key references for predicting economic development. Based on theoretical analysis, we develop a set of testable hypothesis: it is expected that there is long-run positive relationship between foreign trade growth and changes in labor quantity; the change of western China’s industrial structure that is affected by BRI will contribute to labor attraction in manufacturing and services. The paper will assist in understanding the regional economies from the perspective of the labor market.

Focusing on the change trends in the number of laborers in the western regions, this study employed a VAR model to analyze the changes in trade structure and in the quantity of labor, and used the trend extrapolation method to predict future changes. Next, the methods of share-shift analysis (SSA) and the deviation of industrial structure (DIS) were combined to compare the differences in industrial growth at regional and national levels, and regional advantages were captured with the implementation of the BRI to identify potential industries that may attract new labor. Through an
analysis of the size and structure of the labor force in the western regions, this study predicted the changes in the labor market with the further implementation and development of the BRI and dynamically evaluated economic development from the perspective of labor.

3.1.1. Analyzing Changes in the Quantity of Labor

VAR models have been widely used in labor market adjustment. They have been used to analyze the relation between trade, unemployment, and job transition in Germany [35]. In Poland, a VAR analysis of unemployment and FDI were conducted [36]. They have also been used in analyzing the potential change in the quantity of labor [37,38]. The VAR model effectively predicts interdependencies among multiple time series, and analyzes the dynamic effects of random error terms on system variables. The impact of economic development on the quantity of labor in the western regions is not only reflected in an increase in labor demand in the current period, but also in the future probabilities and willingness of labor to move into the area, based on the trends of the current social environment. Hence, the influence of economic development tends to affect the quantity of labor in both current and future periods. Therefore, the VAR model constructed in this study considered both endogenous and hysteresis characteristics of the variables. In addition, foreign trade data were used to analyze the dynamic impact of changes in import and export on the labor system, and impulse response analysis was adopted to predict the trends in the changes. All data used is collected from China Statistical Yearbook and China National Bureau of Statistics, and compiled by the authors.

The VAR model reflected the relationship between foreign trade and the quantity of labor. An autoregression model was constructed with all variables from the current period; the hysteresis characteristics of each variable were considered to estimate the dynamic effects of endogenous variables on the system. With the VAR model, we can finally use the impulse response function to predict the response to shock in the next periods. The VAR model with a lag order \( p \) is expressed as follows:

\[
Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \ldots + A_p Y_{t-p} + bX_t + c + \mu_t
\]  

where \( Y_t \) is the vector of endogenous variables, and the formula expresses the influence of the variables on the system with a lag order \( p \) and the development trend and a constant intercept. In this study, labor and import and export data were endogenous. We defined \( \ln Y \) (the number of employed people, logged), \( \ln IM \) (import volume, logged), and \( \ln EX \) (export volume, logged). In addition, according to the Schwarz Criterion (SC) and the Akaike information criterion (AIC), we chose the lag length to be 1.

To avoid the existence of unit root and therefore spurious regression, we use the augmented Dickey–Fuller (ADF) test to check the stationarity of the time series. The result of the ADF test showed that the data are nonstationary, but integrated at order 1 (stationary), at the 5% critical value. The Johansen test indicates a cointegration relationship between the labor quantity, imports, and exports at the 5% critical value. With trace statistics (39.20630) being greater than 5% critical value, we rejected \( H_0 \) at 95% significant level, which means there is a long-run cointegration among endogenous variables. The results of the test statistics of the data are provided in Tables 1 and 2.

### Table 1: Augmented Dickey–Fuller (ADF) Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>Test Statistic</th>
<th>Prob.</th>
<th>1% Critical Value</th>
<th>5% Critical Value</th>
<th>10% Critical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \ln Y )</td>
<td>−2.317799</td>
<td>0.4094</td>
<td>−4.394309</td>
<td>−3.612199</td>
<td>−3.243079</td>
</tr>
<tr>
<td>( \ln IM )</td>
<td>−2.534573</td>
<td>0.3105</td>
<td>−4.30982</td>
<td>−3.57424</td>
<td>−3.22173</td>
</tr>
<tr>
<td>( \ln EX )</td>
<td>−1.380925</td>
<td>0.8460</td>
<td>−4.29673</td>
<td>−3.56838</td>
<td>−3.21834</td>
</tr>
<tr>
<td>( D(\ln Y) )</td>
<td>−4.160201</td>
<td>0.0171</td>
<td>−4.41634</td>
<td>−3.62203</td>
<td>−3.24859</td>
</tr>
<tr>
<td>( D(\ln IM) )</td>
<td>−4.735703</td>
<td>0.0037</td>
<td>−4.30982</td>
<td>−3.57424</td>
<td>−3.2217</td>
</tr>
<tr>
<td>( D(\ln EX) )</td>
<td>−4.562573</td>
<td>0.0055</td>
<td>−4.30982</td>
<td>−3.57424</td>
<td>−3.2217</td>
</tr>
</tbody>
</table>
3.1.2. Analyzing Changes in the Labor Structure

The BRI brought about some major changes, such as geo-economic locations and relations among regions, which lead to structural growth and changes in the regional economy. Some industries could enjoy comparative advantages, which is reflected in the big share of industrial outputs, and these in turn create new job positions. To capture this, the SSA method was used to analyze structural growth and change in the regional economy, and the DIS method was used to identify whether these industries can absorb new labor.

Specifically, the changes in the three industrial sectors (agriculture, manufacturing, and services) were compared with the total regional growth rate of the western regions and the national industrial growth rate, to analyze the push and pull effects of industrial development on labor structure. The study mainly focused on the analysis of the differential shift (comparative advantage).

In the SSA, the actual growth of the regional economy can be decomposed as follows:

\[ G = RS + PS + DS \]

where

\[ RS = \sum Y_i^0 \times R \]
\[ PS = \sum Y_i^0 R_i - \sum Y_i^0 R = \sum Y_i^0 (R_i - R) \]
\[ DS = \sum Y_i^0 r_i - \sum Y_i^0 R_i = \sum Y_i^0 (r_i - R_i) \]

where \( Y_i^0 \) signifies the production of the \( i \)-th industrial sector in area \( Y \), \( R \) signifies the total growth rate of the three industrial sectors of western China, \( R_i \) signifies the total growth rate of the \( i \)-th industrial sector of western China, and \( r_i \) signifies the growth rate of the \( i \)-th industrial sector of each region.

The regional share (RS) highlights the leading/lagging position of the growth of a given industrial sector in a given region, in relation to the GDP growth rate. The proportional shift (PS) highlights the leading/lagging position of the \( i \)-th industrial sector of western China in relation to the national growth speed of the given industrial sector, which signifies the development speed of the industrial sector of the region. The differential shift (DS) highlights the additional growth of the regional economy, in addition to the growth of West China, and the overall industrial growth, which signifies the differences in the growth of the \( i \)-th industrial sector in the western regions, and that at the national level (the regional comparative advantage).

Furthermore, DIS was used to identify industries that may absorb new labor with the increasing labor demand from the growing production:

\[ C_i = \frac{(Y_i/Y) - (L_i/L)}{1} = 1 \]

where \( C \) is the degree of deviation of the industrial structure, i.e., labor productivity, \( Y \) is the total output value of the region, \( L \) is the total number of people employed in the region, and \( i \) represents the three major industries. In this formula, if the deviation of the industrial structure is greater than 0 (positive deviation), the proportion of employment in the industry is less than the proportion of the added value, and labor productivity is high, then this industry shows the possibility of labor inflow; otherwise, it could lead to labor outflow. The deviation of the industrial structure will lead to the reallocation of labor resources.
The SSA method can be used to measure regional comparative advantage cross-country, which accurately determines the development status and the competitiveness of each region's department. It helps to identify industries with better chances of expanding, and thus, increasing potential labor demands. DIS analyzes the gap between labor demand and production needs, informing us whether labor demands are covered in these industries, and how great the attraction of labor is into these industries. By connecting these two together, we hope to find whether industries with a greater attraction of labor can correspond to industries that will probably grow in the future (and thus increase the labor demand), and whether there are labor gaps in such industries. This could provide us a more comprehensive view of the extent of labor attraction in each industry, and the future patterns of the labor structure in the western regions.

3.2. Study Area and Data

This study conducted an empirical analysis of foreign trade from 12 provinces in western China from 1994 to 2015. The data were mainly obtained from the China Statistical Yearbook and the databases of the China National Bureau of Statistics, the China Regional Economy Database, and China Economic and Social Development Statistics Database. The data included the number of employed people in urban areas and import volume and export volume of 12 provinces in western China (Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang) from 1994 to 2015 (Figure 2). Given the limitation of the data for more detailed records on industrial classifications, the analysis was based on industry classifications into agriculture, manufacturing, and services.

4. Results

4.1. Labor Growth

In 2015, the total import volume of the western regions was USD 99,180.677 million, and the total export volume was USD 191,717 million, an increase of 20 times and 20.49 times, compared to the regional and total export volume of 1994, respectively. As shown in Figure 3, foreign trade in
western China shows exponential growth. In addition, with the improvement of productivity and technology, the export volume exceeds the import volume, and the trade surplus shows an expansion. The fluctuations in the trend of employment appear to be consistent with those of import and export trade, suggesting a positive relationship among these variables. Particularly during 2008 and 2009, affected by the financial crisis, both import and export trade and employment dropped drastically. With the gradual recovery of trade, employment then increased significantly.

![Imports, Exports and Employment in Western Area](Figure 3. Imports, exports, and employment in the western area of China. Source of data: China Statistical Yearbooks 1995 to 2016, and the databases of the China National Bureau of Statistics of China, figure drawn by the authors.)

According to the results of the VAR model, import, export, and labor size have a long-running equilibrium relationship and a single cointegration relationship \( p < 0.05 \). The corresponding cointegration equation that reflects the long-run equilibrium between labor and import and export trade is as follows:

\[
\ln Y = -0.032008t + 0.008879\ln IM + 0.032585\ln EX \\
(0.10702) \\
(0.07753)
\]  

(4)

In this equation, the first coefficient analyzes the trend of the time series. This result implies that both import and export trade have a positive pull effect on local employment. Under a critical value of 10%, the coefficient of export is significant. More specifically, the contribution of export volume on employment growth was greater than that of the import volume. This is because import growth has an impact on the distribution of local industries: industries improve the industrial structure by utilizing comparative advantages. While export growth leads to an increase in market demand and productivity, it also drives the growth of the local economy and produces more jobs. Thus, in the absence of other endogenous variables, foreign trade growth has a long-term, single cointegration positive equilibrium with labor quantity change. By estimating the impulse–response function, we can further explore the following themes.

4.2. Changes in Labor Structure

In general, \( G \) represents the total growth level of the western region. From 1994 to 2015, the growth rate of western China (1613.2%) was higher than the national average (1316.7%): the increment of PS and DS reached 259.4 billion yuan, which is 2.96% higher than the national average. Focusing on 2011 to 2015, the overall distribution of the western growth pattern shows that manufacturing and services
showed a large increment over five years, in which the services industry enjoyed the highest growth rate (Figure 4). Manufacturing and services are now the main growth industries.

To more clearly reflect the development of industry in the west following the implementation of the BRI, this study utilized 2013 as the time point to compare development trends prior to, and following 2013 (Figure 5). Based on the result, we see that the share of industrial structures in the western regions that underwent a major transformation following 2013. Overall, however, the share of industrial structures in the western region shows negative growth, and the growth rate of manufacturing is negative, which is one of the main factors for the region’s inferior position regarding industrial structure. With a good development momentum of services, the share of industrial structures has seen an increase from 2540.3 in the first stage, to 4416.9. Following 2013, the gap between the PS of the two industries has continued to increase. As PS describes the national level growth of industries, this result can be interpreted as follows: western China now has a better chance of obtaining advanced manufacturing firms flow in as accepting industry transfer from other regions. This confirms the industry advantage of western China in manufacturing.

From the perspective of the DS share, from 2011 to 2013, manufacturing and services showed a huge growth advantage over the whole country, as the comparative advantage of developing these industries was large. Although this advantage has weakened after 2013, the total increment still far exceeds that of agriculture. This result implies that, in western China there is great a comparative advantage over other regions, which provides the foundation for local development. Since there is clearly a greater advantage in services, as well as manufacturing, an increasing number of firms may become attracted toward the region and upgrade its industrial structure.

Using the DIS method, we selected 10 time nodes since the 1990s, and calculated their deviation degree (Figure 6). Results showed that DIS in agriculture at both the regional and national levels remained negative and showed a downward slope, which indicates a constant wasting of labor over a decade, eventually leading to a steady labor outflow. Manufacturing and services showed a negative deviation, implying that there is great demand for labor in these two industries. Although the trends show a decrease over time, the deviation degree of western manufacturing is much greater than that at the national level, which leads to a positive inflow of labor.

Combining these two methods, further analysis was conducted, as discussed next. From the DS share, it is possible to identify the industry that has the greatest potential for development. From the DIS analysis, it is easy to identify the industry that lacks labor. From these two, it is clear that the industry expanding the fastest corresponds to the industry with most labor demands. Thus, western China will not only experience an increase in the quantity of labor but also the continuous labor inflow in manufacturing, which will finally change its labor structure.

![Figure 4. Total growth in the three industries from 2011–2015. Source of data: collected from Statistical Yearbooks of 12 western provinces, compiled by the authors.](image-url)
Sustainability 2019, 11, x FOR PEER REVIEW 11 of 18

Figure 5. RS (Regional Share), PS (Proportional Shift), and DS (Differential shift) in three industries from 2011–2013 and 2013–2015. Source of data: collected from Statistical Yearbooks of 12 western provinces, compiled by the authors.

Figure 6. Deviation degree of the industrial structure of western China and the nation. Source of data: collected from Statistical Yearbooks of 12 western provinces, and the database of the National Bureau of Statistics, compiled by the authors.

5. Changes in the Labor Force of Western China with the Implementation of the BRI

5.1. The Long-Running Equilibrium between the Quantity of Labor, and Import and Export

According to the cointegration analysis, both import and export trade have a positive pull-effect on local employment. The contribution of the export volume on employment growth is greater than
that of the import volume. Following the positive correlation between the import and export trade and labor force, this study further evaluated the trends of future impacts.

An impulse–response function was used for analysis. Figure 7a shows the response of employment to the increase in export volume. The increase in a unit export volume in the current period was found to lead to a significant increase in the number of employed people in the next 10 periods. The growth in export led to the expansion of foreign demand, with a corresponding increase in the demand for labor. With the establishment of emerging trade and industrial bases in regions such as Xinjiang and Beibu Gulf economic zone, the “opening toward the west” has been continuously reinforced. Now, the border areas have become an important gateway for communication between China and trading countries, leading to a growth in exports in the corresponding areas. The growth in export has led to the expansion of foreign demand, with a corresponding increase in the demand for labor. This expansion led to a shortage of labor in the local market; as a result, wages rose and attracted an inflow of labor. In addition, from the perspective of the labor structure, the enhancement of trade cooperation between neighboring countries provided opportunities for the integration and upgrading of industries, which attracted an inflow of high-quality labor.

Figure 7. (a) Response of export to employment over 10 periods; (b) Response of import to employment over 10 periods.
Figure 7b shows that an increase in unit import volume leads to an increase in the number of people employed in the following periods. This growth is sluggish and small, which represents two contradicting effects. On the one hand, the impact of imports on industrial distribution led to a fiercer business competition, which stimulated innovation and facilitated employment. Also, countries developed production according to their comparative advantages, reducing the costs of production and enhancing the international competitiveness of the industry. Imports of primary raw materials, such as petroleum and iron ore, supplemented domestic supply cutting down costs and stimulating competitiveness, which directly created more jobs in the corresponding fields. On the other hand, an increase in import may cut off employment. The main reason for this is that the growth of imports tends to dominate in the share of the domestic market, which is particularly harmful for emerging industries. Therefore, the negative impact partially offsets the positive effects, and imports have a weaker effect on the labor market. Foreign trade lowers the long-run wage in the import-competing sector, which increases the gap between the import sector and the export sector, and it limits the incentives for labor to flow in. This may also be one reason for the contribution of imports to labor attraction being lower than the export change [39].

In general, the cumulative response to imports and exports was a significant increase in the number of people employed in the western region over the next 10 periods. It further revealed that the import and export trade volume in the western regions create a large number of employment opportunities, and have a continuous impact on future employment trends.

5.2. Trends of Labor Structural Changes

As is already known, trade is closely linked to industrial structure, by affecting the market demand and producing optimization effects. With the deeper opening of the western China market, improvements in trade affected the composition of industries by them developing comparative advantages to gain maximum profits. As a result, local manufacturing and services developed rapidly as well. Also, the BRI is expected to improve the local social environment and education level, to create favorable conditions for the region, to change the persistent outflow of labor and to attract more inflow. Therefore, the industrial development requirements and the supply–demand gap of labor have led to a shift of labor toward these industries. According to the findings of the SSA, the total industry growth rate in western China was greater than the national rate, and the comparative advantage (DS Share) in manufacturing and services was prominent. Also, the findings from DIS reveal that the western provinces are facing great labor demand in both manufacturing, as well as services. These results indicate that both these industries in the western regions have noticeable comparative advantages in manufacturing and services, which are growing fast; we can foresee a greater labor demand in the future, thus facing a greater deviation degree and generating a greater probability for labor inflow.

Take Guangxi as an example. From 2011 to 2015, the foreign trade in Guangxi has grown rapidly to 51090.5 million dollars, which accounts for 20.3% of the whole provincial GDP. Major exports include manufacturing products like fabric and porcelain, and agricultural products like seawater products. Major imports include crude oil, machine tools, paper pulp, as well as electrical products. In the meanwhile, the DS share has also increased to 9.15% in manufacturing, compared with −10.64% in agriculture and −9.67% in services. Following the leading role of manufacturing, the DIS results in Shanxi have also shown great labor demand in this industry. The DIS in manufacturing reached 152.48 in 2015, compared with 70.34 in 2011, which is consistent with the improving comparative advantage shown. Combining the DS and DIS results of Shanxi Province, we may say that over a relatively long period, there will be a huge demand in manufacturing labor. This demand change will eventually attract more inflow of labor. As shown in the data, in 2015, labor in manufacturing increased to 5130 thousand, which is 72.3% greater than that of 2011.

At the regional level, although the overall development of manufacturing appeared to be vigorous, its disadvantages were also highlighted. By comparing the growth rate from 2011 to 2013, and from 2013 to 2015, a major part of the negative growth in PS originated from manufacturing. There were problems
of large volume, low profit margins, and unbalanced industrial structure. However, the western region and the country as a whole underwent a stage of industrial structure upgrades at around 2013, when the PS showed significant negative growth in manufacturing, while that of the services increased rapidly. The negative growth brought about by the industrial structure at present is mostly attributed to the adjustment of industries nationwide. Since the eastern province plays a key role in transferring manufacturing to the western region, and accepts high-profit services, in the future, it can be predicted that manufacturing in western China will definitely show significant development. Also, from 2013 to 2015, the increase in DS of manufacturing was $-2.01\%$, indicating that its comparative advantage in the region has decreased substantially, and that services have begun to play an increasingly important role. The western region will finally see an upgrade of industrial structure from manufacturing to services.

Therefore, although the overall industrial growth of western China in 2015 was lower than that in 2013, the negative growth was mainly due to the transformations in the industrial structure. The growth of services and the decline of manufacturing are expected to change the overall industrial structure of the western regions, and eventually push the region into a stage of rapid development.

5.3. Varying Trends among the Regions in Western China

By analyzing the interception of provincial data over the past five years using SSA, it is seen that in most provinces, for example Ningxia and Shanxi, there is an obvious comparative advantage in manufacturing over the other two. This advantage is growing too. Several relatively more developed provinces have shown a structural change. In Sichuan and Chongqing, services grew faster than manufacturing and contributed most to their economic growth. From 2011 to 2015, the deviation degree of the western provinces and cities remained consistent with the overall level of the region, with manufacturing having the strongest attraction to labor inflow.

Comparing both the DIS and SSA methods, agriculture has seen negative growth in most provinces, and labor has seen an outflow. In most provinces, manufacturing, with its great advantage over that at the national level, is the one with the most demand for labor inflow. In Ningxia, Yunnan, Xizang, Guangxi, and Shanxi Province, with a relatively high DS share over western provinces, the deviation degree in manufacturing is relatively larger than that in other provinces. In services, provinces such as Sichuan, Qinghai, and Chongqing show a great advantage over the others, and the deviation degree shows the fastest yearly increase. Combining these two, we predict there will be constant labor flows into manufacturing, as well as services, since the maximum jobs are in these sectors in these provinces.

However, the situation is not the same in all provinces. In Guizhou, agriculture has the biggest advantage, although the deviation degrees are still high in manufacturing and services, which calls for labor inflows; in Neimeng, the development of all the three primary industries are below the national level; in Xinjiang, there is a huge advantage in services, while the deviation degrees are negative across the three industries, and there is labor outflow in manufacturing and services. It can be seen that the transformation in the industrial structure of Xinjiang province is relatively slow.

Policies are implemented to accelerate their development. Xinjiang was proposed to be the “Core Area” of the Silk Road, and its geographical conditions were suitable for establishing it as a transportation hub and an open window. Shanxi is listed as a free trade zone, considering its geographical advantages and its economic foundation for playing a central role. Gansu, Ningxia, Qinghai, and other provinces have become important industrial and cultural exchanges bases through their cluster development. Guangxi has expanded its competitive advantage by its location near the sea, and by the Pearl River Delta. Due to different locational advantages, the dividends of BRI are not uniform over the different regions, and hence, there are differences in the development paths of the provinces.

6. Conclusions

This paper selected data from the 1990s to the present, finding that although there is an increasing labor force in western China, the region continues to have a low proportion of skilled workers.
Since the implementation of BRI, the support for trade under this initiative is expected to bring about changes in this area. Our main interest lies in whether this change in trade will affect the number and structure of the local labor force. Using quantitative methods like VAR, SSA, and DIS, we arrived at the following conclusions:

By constructing a cointegration equation, we conclude that import and export trade volumes have a strong driving effect on the increase in the quantity of labor; in addition, the pull effect of the exports is greater. The impulse response function predicts that in the next 10 periods, the cumulative response of the total import and export volume will bring about a significant and continuous increase in employment in the western region of China. This is because the BRI has opened the channel to foreign markets, leading to an increase in labor demand, rising salaries, and labor force inflows. In addition, sufficient raw material inflow from neighboring countries will improve the competitiveness of the local industries, and thereby will attract more labor inflow.

Apart from the numerical changes, BRI leads to a structural change in the labor force. SSA results have seen the western area rapidly increase in the manufacturing industry, and its comparative advantage at national level. It implies an industrial upgrade in the area. While accepting the manufacturing industries that have shifted from the eastern regions, the western regions have also transferred low-end manufacturing to countries along the Road. Comparing the periods before and after 2015, the structural change accelerated after the implementation of BRI. With regard to DIS, the high deviation degree of manufacturing suggests a huge demand for labor, which will attract an increasing labor inflow.

As a key area of BRI, trade has gained support from many governments, and economic cooperation has been continuously strengthened. Among them, labor is an important indicator of regional economy, and its observation is of great significance for a dynamic evaluation in the future. Theoretically, this article pointed out BRI’s influence on labor mobility under the perspective of trade, and provided a workable quantitative method to analyze its influence on labor. Practically, the adjustment of the industrial structure has generated more jobs in the local areas. Using the results above, as more comparative advantages emerge with great policy bias toward western China, domestic and foreign firms find it more profitable to move in with lower cost and to open up the foreign market. This will provide more jobs in the western area. Labor would gradually move in or move back to search for higher welfare and for option value. With more incoming population flow, and a higher productivity, these developments will in turn increase the openness, and connect closer with countries along the Road.

However, such changes are yet to attract more labor. One explanation for this could be the “rigidity” in the labor market caused by the relatively underdeveloped economic conditions and social environment in the western regions; another is that there are large mobility costs when labor shifts occurs between sectors [40]. Therefore, the implementation of the BRI has required the government to cast increasing attention towards the development of the western regions, in terms of the welfare system, salary system, and other supporting infrastructure, to create a sound “soft” environment. For firms, it would be profitable to grasp policy advantages, invest on industries with high expansion space, and provide workers with necessary training to narrow the gap between the demand and labor quality. Furthermore, since the optimization and upgrade of industrial structure have accelerated the transfer of labor to high-efficiency sectors, the consistency between labor training and industrial change has become an urgent issue owing to China’s dual labor market. Another issue is that rapid acceleration in labor demand for skills and openness will widen the gap between skilled and low skill workers (Toh, 2012). To ensure that labor can adapt to this structural change, education and further training in professional skills should be considered seriously. By doing these the quality of labor will finally match up with companies’ demands, guaranteeing the sound functioning of society.

This article provides a feasible method for the prediction of foreign trade development and labor flow, gives a general example for the changing of variables under the impact of exogenous variables, such as policy shocks. It can also be applied into other regions inside China, and countries other
than China, in not only BRI, but in other shocks. In the future, with the further implementation of the BRI initiative, more countries like Italy are recently becoming involved, the influence of the BRI would become stronger, providing clearer clues about the dynamic change of industries, as well as the labor market. However, there are still some limitations, and more efforts are needed. First, this article has categorized industries roughly as agriculture, manufacturing, and services, without specifically characterizing which firms might undergo significant changes, due to the policy shock. It only presents a vague map, and a more specific division is worth studying. Also, being limited by the available data, this paper may do better by using data at a finer level to improve the analysis. Furthermore, the analysis used indirect signals of labor inflows and outflows, by showing the development potentials and the relative labor demand. More straightforward quantitative methods may be applied in the future, based on data accessibility.

We may look forward to a greater upgrading of the industrial structure, accompanied by a more suitable labor structure. With the BRI, China has started to act within the frame of the UN 2030 Sustainable Development Goals. By expanding trade and technological exchanges, environmentally friendly sectors will expand under the basis of transferring excess capacity, which promotes economic growth and creates new jobs. This would help western China to improve its labor structure, maintaining labor balance across regions, and help countries along the BRI to actively increase employment and eliminate poverty. In the future, when the BRI plays an increasingly important role, the dynamic changes of industries, as well as the labor market, will become clearer. With more data accumulating, the limitations mentioned above can be overcome, as the mechanisms underlying this dynamic change become apparent, and organizations can leverage this mechanism. Also, other social parameters; for example, the population and quality of life in these territories, is also worth working on.

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