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Literature Review: The Green Economy, Clean Energy Policy and Employment

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Abstract

The relationship between the green economy and employment is never as simple as it appears. This article analyses this relationship based on studies of clean energy policies in different countries. Through literature studies, we found that the green economy has positive effects on employment in both developing and developed countries, while the results can alter according to the type of measurement adopted. However, the Green economy can also have negative effects in some countries like Spain. Moreover, it may shape the labor market in another way if policy influence is taken into consideration. Finally, we must realize that there are some problems with the current researches in this area, such as the lack of studies on different countries and energy types, inadequate theoretical support, limited analysis of such relationship, and so on. We suggest that scholars should focus on mechanisms whereby this relationship is influenced and policies to regulate such relationships in further researches.

Keywords: Green economy and employment; literature review; clean energy

1. Introduction

The green economy, which will be a new direction for the future economy, has attracted extensive attention from scholars due to its effects, especially its employment effect. UNEP has stated that a green economy creates jobs and enhances social equity (UNEP, 2011), showing the positive effect of the green economy on the labor market. The International Labor Organization also believes that the green economy can create millions of job opportunities.

Not only corporations but governments also make every effort to encourage the green economy, in order to boost the labor market. Barack Obama set the goal that 25% energy in the United States will be generated by renewable sources by 2025 (Pollion R, Heintz J, et al. 2009). The National People's Congress and the Chinese People's Political Consultative Conference in 2010 put a green economy as the top

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priority in the belief that it will be an employment economy. From the standpoint of the government, the development of the green economy will greatly increase the number of job opportunities.

However, the different empirical experiences in different countries reveal more complex employment effects. For example, Spain and German reflect a very distinctive situation, as the green economy in these countries has a negative effect on green jobs. Green programs in Spain have destroyed 2.2 jobs for every green job created. Moreover, all fuel technologies create more jobs per unit energy than coal and natural gas (Max Wei, Shana Patadia, et al., 2009).

Can the green economy create a large number of new positions? If so, what is the exact number? If not, what is its real influence?

Actually, from the former research, we can see that there is never a simple Yes/No answer. The understanding of the term employment ‘varies’ among scholars (Borel-saladin J M, Turok I N.,Konopnicki, Pollin R Cetin M Erican N, 2012, 2009,2011). Some scholars consider inner mechanisms while others do not. As the result, the same situation can lead to completely different conclusions depending on the person who studies it and the method he or she uses, so a clear literature review is needed.

This paper consists of five sections. Section 1 is the introduction. Section 2 focuses on the literature. Section 3 reveals some research methods. Section 4 analyses some gaps in the current literature. Section 5 summarizes the conclusions and author’s views.

2. Introduction

2.1. Green economy and employment

2.1.1 Definitions of a green economy

Green economy

The concept of a green economy was firstly mentioned by the famous economist Pearce, who suggested that the environment and economy necessarily interact (Pearce, 1989). UNEP gives a clear definition of a green economy in the report: a green economy is one that concentrates on human and natural factors, and also can create high-salary jobs (UNEP, 2007). In 2011 UNEP enriches the meaning of ‘green’ to refer to an economy that is not only efficient but also fair, ensuring a just transition to an economy that is low-carbon, resource efficient, and socially inclusive. (UNEP, 2011)

A green economy and energy policy

A green economy has an inner relationship with a clean energy policy, and has a more politically applied focus (UNEP). The real value of environmental services and the real costs to the environment are included in national policies (Fulai, Sheng, et al. 2011). The first sector of the green economy is renewable energy (Karl Burkart, 2009). The development of new energy depends on policy (Guo, 2011). So, a green economy needs the support of public policy.

Energy policy and employment

A green economy has the character of public goods. In a green economy, growth in income and employment should be driven by both public and private investment (UNEP, 2011). Greening the economy has great potential to stimulate growth globally (UNEP, 2011). Renewable energy can be a driver for employment (Apergis N, Payne JE, 2010).

2.1.2 Classification of jobs and employment

Green jobs

The definition of a green job varies from person to person, but all agree that green jobs are jobs linked to the environment and clean energy. Some believes that green jobs can be defined as jobs that involve protecting wildlife or ecosystems, reducing pollution or waste, or reducing energy usage and lowering

carbon emissions, as well as jobs in industries and sectors that produce environmentally beneficial goods and services (UNEP, 2008). Some conclude that green jobs are created directly through activities that benefit the environment (Borel-saladin J M, et al., 2012). Moreover, green jobs are jobs linked with energy conservation or increasing the supply of renewable or clean energy sources (Konopnicki, 2009). If we consider the wider impact of green growth policies, green jobs including direct, indirect and induced jobs. The concept of green collar jobs to some extent is similar to green jobs, and green collar jobs are jobs created by firms and organizations that aim to improve the environmental quality (UNEP, Pinderhughes, 2006). It should be noted that the influence of green jobs is debated (Morris, Andrew P. et al., Pollin 2009).

The employment effect

The employment effect includes direct effects, indirect effects and induced effects, which is similar to the classification of green jobs (Pollin R, 2009). Moreover, employment can also be divided into gross employment and net employment. Gross employment is the sum of direct and indirect employment (Cetin M Erican N, 2011). Net employment considers the traditional job loss from the green economy, for there are potentially negative or displacement effects of the green economy (Borel-Saladin J M, Turok I N, 2012).

2.2. Relationship between green economy and employment

Many scholars find that the green economy has a positive impact on employment. It creates jobs and enhances social equity (UNEP, 2011). Renewable energy is a driver of employment, increases the demand for labor and results in the net creation of jobs (Engel, Ditlev, et al., 2009). Moreover, a low carbon economy may influence the employment structure, and also improve the scale of low carbon economy (Liu, 2011). A green economy has also been found to have a negative effect on employment, however, as the quantity of employment may reduce. The creation of one green job may destroy another job (Green K P., 2011). Mandated subsidies for renewable generation will necessarily reduce economic wellbeing (Lesser J A., 2010).

Other employment effects are also caused by the green economy, which may change according to current policy (Cai W, Wang C, et al., 2011). The employment effect changes with the period of the green economy.

2.3. Empirical results and experience from the green economy and employment

2.3.1 The green economy has a positive effect on employment

In some developing countries, the green economy has a positive effect on employment. In 2011, the potential strategies for ensuring that green jobs are decent jobs using the case of wind power plants (Chan C K C, Lam M C, 2012). Turkey also finds that the green economy has a positive effect on employment. Solar energy technology's creation of direct employment and the primary source of energy demand have important employment effects on economics (Cetin M Erican N, 2011). Africa's Green Jobs report IDC points out that, in the short-term, the total net employment potential is 98,000 jobs, and the long-term employment potential is 462,567 jobs (IDC, 2011). Green economic activity appears to generate more local jobs than fossil-fuel-based industries in South Africa, so policy involvement in greening the economy is needed (Pollin Robert et al., 2009).

In some developed countries, the positive employment effect of the green economy appears. In America, the clean energy policy on employment is significantly positive, and net job gains rose to about 660,000 jobs in 2010 (Barrett, James P, et al. 2002). The American Recovery and Reinvestment Act and American Clean Energy and Security Act show the attitude of the federal government. The expansion in clean-energy investments can generate a net increase of about 1.7 million jobs (Pollin, Robert, et al.,

2009). All non-fossil fuel technologies create more jobs per unit energy than coal and natural gas (Wei M, Patadia Sand Kammen D M, 2008). The renewable energy sector generates more jobs per unit of energy delivered than the fossil fuel-based sector (Engel, Ditlev, and Daniel M. Kammen, 2009). People with disabilities in the US can have employment opportunities as well (BruyÃ¨re S, Filiberto D, 2013). A substantial number of new jobs will be created and will be needed to support nuclear industry growth (Kenley C R, Klingler R D, et al., 2009).

In Canada, growth in the renewable sectors and energy efficiency in the Revolution scenario led to a net gain in jobs (Rutovitz, Jay and Alison Atherton, 2009). In Ontario, a green investment agenda can offer the potential to create jobs within the 50,000 range, as anticipated by the government (Pollin R, Garrett-Peltier H, 2009). In the UN, capacity growth in renewable energy with very strong growth in wind energy and biomass (Rutovitz, Jay and Alison Atherton, 2009). In Japan, the Prime Minister ordered the Environmental Minister to draft a Green New Deal including funds for green job creation. Japan's National Parks Program has a green worker program that has created green jobs (The Spanish Electricity System Preliminary Report, 2011).

What's more, the European Union's renewable energy policies are among the most progressive in the world. EU estimates indicate that there are currently 150,000 direct jobs in wind energy in the EU, half of the entire renewable energy industry (UNEP, 2011). The renewable energy sector is a very important one in terms of employment and value added (Ragwitz M, Schade W, Breitschopf B, et al., 2009).

2.3.2 The green economy has a negative effect on employment

The experience and empirical study mainly focus on Spain. The country has a different situation. In 2008, researchers find that the use of renewable energies offers the opportunity to diminish energy dependence, reduce the emission of CO₂ and create new employment (Moreno B, 2008) while in 2009 more jobs were destroyed than were initially intended to be created (Alvarez G C, Jara R M, Julian J R, 2009). Up until 2011, Green programs in Spain destroyed 2.2 jobs for every green job created (Green K P, 2011) and each green megawatt installed destroys 5.28 jobs on average elsewhere in the economy (Alvarez G C, Jara R M, et al., 2009). Two-thirds of the 110,500 green jobs created were in the fields of construction and installation, 25% were in administration, and 10% were in maintenance and operations (The Spanish Electricity System Preliminary Report, 2011).

The green economy led to a negative effect on employment that also appears in other countries. Europe's experience reveals that the policies on the green economy are terribly economically counterproductive (Lesser J A, 2010). Rising energy costs loses jobs (Rose, A.Z., and Wei, 2006).

2.3.3 The green economy has other effect on employment

The green economy leads to other employment effects: the employment effect caused by the green economy changes according to the policy or the country in different periods may experience different effects. Mitigation policies caused a total of 44,000 net job losses. However, as the share of renewable energy that has indirect employment impacts increased, the policies from 2006 to 2010 actually resulted in 472,000 net job gains (Cai, 2011).

The high cost of the green economy: the green economy may generate green jobs and the employment effect, while only considering the quantity of jobs, but failing to include the cost is not totally correct. Green jobs are often not economically viable (Furchtgott-Roth D. 2012). Green jobs lead to high cost in many countries; one green job cost in Italy could create almost five jobs. Denmark has the highest electricity prices in the European Union (Green K P, 2011). In Spain, \$860,000 was spent on each green job (Lesser, 2010). U.S. green job initiatives result in a higher cost of energy to businesses (Kenley C R, et al., 2009). The idea that government "investment" in green jobs helps America's economy is not necessarily true (Environmental Audit Committee, 2010). Longer-term costs are difficult to quantify with uncertainties in their magnitude (Engel, Ditlev, et al., 2009).

3. Research methods in the literature

Papers on the green economy and employment mainly use two kinds of methods, from models to analysis.

Some researches use the input-output model to estimate the total job creation figure. Pollin R, Garrett-Peltier H also uses input-output figures for Ontario (Pollin R, 2009). Some researchers also use econometric methods to evaluate the relationship between the green economy and employment, and macroeconomic modeling to find the relationship between the green economy and employment, using the applied model PANTA RHEI to do the research (Lehr U, Lutz C, Edler D, 2011). Case analysis is one of the most popular methods for this research.

4. Gaps in the current literature

There are also gaps in the current literature.

First, more countries should be concerned. Based on the current literatures, only several typical countries are taken into consideration, which limits our conclusions.

Second, more attention can be paid to new clear energy. The lack of literature on a new energy type is also a big problem.

Third, the features of the jobs will influence the conclusions. For example, green jobs is a big category and green jobs in wind energy including the inventors or high-tech, the workers on building the wind turbines or the cleaner in the wind energy enterprise, by analyzing different jobs, we can achieve lots of other ideas.

Fourth, the theory basis and regulation considerations are weak. Most researches on the green economy and employment are based on the hypothesis that the green economy can create jobs, while this is not based on a clear theory or regulation. If we talk about the green economy, we cannot find a clear basic theory.

Fifth, the literature focused on the cause of the phenomenon is limited. The relationship between the green economy and employment is never a simple liner curve, which may be affected by many things like the level of the green economy.

Sixth, more comparable literature is needed. Although many countries have reached different conclusions, and seldom have scholars compared different countries. What's more, few researches have compared the same country with different employment effects.

5. Conclusions

From the literature review, we can get a relatively clear literature structure of the green economy and employment. We found that the green economy has positive effects on employment in both developing and developed countries like China, South Africa, the US, France and so on, while the result can be changed by the measurement of employment adopted. However, the green economy can also have negative effects on certain countries like Spain. Little literature clarifies the reason why Spain has a totally different fate, so this is an interesting phenomenon on which we can conduct further research. Moreover, it may shape the labor market in another way if the policy influence is taken into consideration. These conclusions seem to conflict but still have a reasonable inner logic.

In the study, we believe that the different measurements of employment lead to three kinds of conclusion. Further, we tried to find out other inner reasons which have an impact on the effect. After arranging the literature at the country development level, we did not get a clear result as expected. However, when considering the negative effect on green jobs, we found that developed countries like

Spain, Germany and Italy, which are first-class countries in a developing green economy, all have a negative employment effect. So we have a question - does the employment produced by the green economy has coloration with the developing situation of green economy, especially in some green economy developed countries. Moreover, if we control the character effect of countries, what other factors would also influence the employment effect, policy or cost, or even something else? What is the inner mechanism? We always believe that the green economy and employment have a more complex relationship for its inner mechanism and outer policy effect.

Honestly, making clear the relationship between the green economy and employment is never an easy thing, but if we understand part of the inner mechanism of the relationship, we can offer reasonable policy suggestions. We must admit that we only know a little about the relationship between the green economy and employment through the literature and it is far from enough. We also know that our review to some extent is weak. To sum up, this literature review is only a start for providing limited assistance for those who wish to focus on this problem.

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