

Determinants of replacement of biofuels for fossil fuels: research Based on views from

Energy, Food and environment by Using a cross-country Panel Dataset

Xiang tao¹, Li kai¹,

¹ School of Business Administration, Northeastern University,

Shenyang Liaoning 110819,

Abstract: Based on a Panel Data Set from To To, this paper utilizes a random-effect tobit model to analyze global determinants of replacement of biofuels for fossil fuels. Empirical results show that dependency to biofuels on a large yield to agricultural products and carbon emission has significant impacts on biofuels consumption, which are mediated by national income per capita; national income per capita has significant impact on biofuels consumption, which includes impacts of both yields and carbon emission.

Keywords: Biofuels; Energy Security; Food Security; Environment

Although for energy security, the impact of food security and the environment is not very clear, biofuels are still growing fast. Annual year, global biofuels output near 1 billion ton, is more than 20% (8) doubled more than twice a year. But with international social concerns about the negative effects of biofuels on food security, more importantly, the shale oil revolution that has a major impact on the energy market in the United States, the output growth of the fuel is beginning to stall in the.

theoretically, biofuels instead of fossil fuels, is a renewable resource to non-renewable resources, thus improving fossil energy shortages, the country's energy security status. and, biofuels alternative fossil fuels, is a clean energy source alternative to clean energies, can improve environmental conditions. If the production of fuel can use waste extensively, or just use the remaining farm products, does not adversely affect food security. However, due to biofuels, reproducibility, there are doubts about cleanliness and economics, biofuels instead of the process of fossil fuel is not smooth. so, biofuels alternative fossils. The problem with fuel is not only a theoretical issue, is a need to pass the empirical check for problems. based on the above considerations, this article intends to pass the empirical test of the method quantitatively studies this issue.

1. Related research review

Although the process of biofuel substitution for fossil fuels is complex, but its primary determining factors for the renewable nature of biofuels, cleanliness and economics. current most of the literature from the technical analysis of the advantages of biofuels, to empirically analyze the literature on the impact of biofuels as a substitute for fossil fuels is still rare.

in the area of the renewable nature of biofuels, foreign academia has made a number of research. The prerequisite for the regenerative nature of biofuels is that they produce more energy than they do in its production process. from this angle, Pimentel^[1] The role of biofuels in energy security is small, even because of energy balance more than (output energy than input energy) less than 1, and for energy security has a negative effect. but malfa and Freire discovery, many studies believe that fuel ethanol's energy balance greater than 1^[2]. Even less competitive corn-producing fuel ethanol, its energy balance ratio also reaches 1.3, while sugarcane produces fuel ethanol can the amount of balance is more than

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the2to8Horizontal.Escobaretc^[3]considers, due to scarcity of land, The renewable properties of biofuels are not very good. but Escobaretc^[3] Research found biofuels currently occupy only global tillage to 1, So it has great development potential., re-nature in the future a period of time can also be secured. and Tilmanwait^[4] The study of the finds that, passmake biofuels from non-food produce, to further enhance biology Renewable fuels. regenerative nature of biofuels can promote energy security, Wianwivat and Johnasafu-adjaye^[5] studies the development of biofuels impact on energy security in Thailand, Discovery Biofuel supply can reduce Thailand dependency on crude oil, and its negative impact on the food market in the long run can be controlled. in the cleansing of biofuels, The Low-carbon nature of biofuels decision The has its environmental advantages. program^[6] think, for the effect of energy utilization on the atmosphere environment, Biofuels have two basic features: First is a single when burning The amount of greenhouse gas produced by the energy, only fossil fuels 1/8 about; Two is as the whole life process from biofuels to say, bio fuels are "carbon",,,, but search mgeretc^[7] The study found that, due to planting material fuel can cause direct and indirect land use changes, bio Fuels production not only reduces carbon emissions, Instead, it will increase the number, °% About carbon emissions. fargione etc^[8] and Tilman, and so on^[9] The study of also considers that, Biofuels Drop The premise of low carbon emissions is not to destroy forests and grasslands, Use existing arable land only and idle, Or use obsolete biomass as a raw material. so, bio Conditional cleanliness of fuel, A country with a high environmental pressure may use the Bio-fuel production to improve environmental conditions. in the economics of biofuels, Knothe, and so on^[ten] Research Discovery, The cost of biofuels depends largely on the raw material. Hunt and Forster^[one] Research Discovery, bio-diesel produced from gutter oil and fuel ethanol from sugarcane benefits for ordinary diesel and petrol, and soybean and rapeseed production bio-diesel and corn-produced fuel ethanol cost also with ordinary diesel and gasoline near. The type of biofuel feedstock in a country largely determines the cost status of a bio-fuel, Escobaretc^[3] Research findings, ~\$/Bucket/ the Crude oil price of the is the break-even point for Brazilian fuel ethanol, ~\$ \$*/Bucket is American fuel ethanol break-even point, 75 ~-\$/the bucket is the euro Continental Biodiesel break-even point. hence, consumption of biofuels by countries The impact of the production efficiency of biofuel raw materials is significant.

Consider the pros and cons of biofuels relative to fossil fuels, its development opportunity vs. Challenge. International Energy Agency has a goal, to 2050 year with Bio Fuels meet over global traffic fuel requirements One-fourth, to reduce the dependency on fossil fuels^[1]. This target can be implemented, can be from now The actual condition is reviewed. This article is exactly The determinants of fossil fuel through cross panel data analysis Bio-ignition material alternatives, to discover factors that help or hinder the Implementation of the.

2. model settings and variable descriptions

2.1 model Setting

to analyze the factors affecting the substitution of fossil fuels for biofuels in a country, this The contribution of biofuels to traffic fuels as a result of variables, its calculation Duketo: where the consumption of fossil fuels is a country's crude oil consumption minus chemical, etc. its The value of his consumption. due to variable value range^[0,100]. due to a lot country not yet using biofuels, the has a large number of values for a variable 0 value, So this article takes a random effect panel that can handle restricted-variable issues Tobit model. at the same time, to control the impact of global economic cycle fluctuations (package quote Global rise in fossil fuel prices), The year virtual variable is. back return to equation like (2):, where, subscript i represents the country, t represents the year, c to constant entry, y , is the year virtual variable, M ,, is a residuals item.

to make the coefficients easier to interpret and reduce the excessive impact of anomaly observations, except out of variables with percentages, Other variables are logarithmic. variable and main explanation variable from table 1 give definition and descriptive statistics, with Energy market data from the U.S. Energy Information Bureau (EIA), per capita arable land, Carbon emissions, per capita income and population variables from World Bank, crop yields from un

FAO(FAO).

to identify the effect of a mediation variable, This article uses the simplified Baron and Kenny^[a] Method. This method is divided into two steps: First step, analysis principal variable (such as grain yield) effect on dependent variables; Second step, If the principal variable has a significant factor, add possible mediation variables (such as national per capita income). If you add a mediation variable, the effect factor of the original principal variable is explicitly decline or disappear, indicates that the mediation variable exists for the original principal variable sub-mediation or full mediation action.

2.2 explains the variable description

The factors that affect the proportion of bioenergy are mainly from the energy market, Food

Market and environment factors. because biofuels can replace fossil fuels, so Biofuels are a choice for improving energy security. The crude oil self-sufficiency rate represents the A country's energy security level, as an explanatory variable for the energy market.

The second type of influence is agricultural production variables. vice-, A country produces a product When it comes to fuel, it also takes into account the country's food security situation. food security In addition to arable land ownership, yield is also important, So per capita arable land and grain The logarithm of yield per unit of food as an explanatory variable. In addition to food to produce biofuels outside, Other non-food crops, such as sugar and oilseed crops can affect bio-ignition production, Therefore, the yield of the sugar crops and oil crops is also selected. to interpret variables.

The third type of impact is environmental factors. When a country has a large carbon footprint, International public opinion pressure will promote the use of Low-carbon energy in the country, for promotion Biofuels Development. and when a country has a high per capita national income, The Congress more plus environment, so there's power to strengthen investment in biofuels. so, we expect, carbon emissions and per capita national income increase biofuels ratio Heavy. the control variable for regression is population size.

3. Empirical Results

This article has a random effect panel based on empirical settings Tobit regression, The overall results of the sample are measured as table 2 shows. symbol characters for the coefficients for the together expected, represents regression parameters for panel regression settings β and β all significant. The regression results illustrate the following conclusion:

3.1 crude oil self-sufficiency rate basically has no effect on the proportion of biofuels, because the factor for CS is not significant. This indicates a total of, sample country in test The energy security situation is not a major factor in the case of biofuels consumption.

3.2 arable land resources can significantly affect the proportion of biofuels consumption, This is in the All models are significantly. When all dependent variables are controlled (model VI), its coefficient is about 0.83, and significantly at the level of 1%, indicates per capita arable land plus 1 times increase the proportion of biofuels 0.83 percentage points. arable resources have a big impact on biofuels consumption, indicates biofuels are also heavily dependent on arable land.

3.3 crop yields affect the proportion of biofuels consumption, and People All national income is an important intermediary variable. because, not controlling per capita National income (model III), the proportion of crop yield to biofuel consumption is significant Positive effects. while controlling per capita national income (model III), crop list The impact of production on the proportion of biofuels consumption significantly decreased, food crops The effects of and crop yields are even less pronounced. This intermediary effect description, If crop yields increase per capita national income, Increase health The share of fuel consumption. and crop yields do not significantly increase per capita national receiptson, does not increase the proportion of biofuels consumed. per capita national income for food the mediating effect of crop and oil-bearing plant yields is obvious, But the mediation effect on the sugar crop is not obvious.

3.4 carbon emissions increase the proportion of biofuels consumed, But national per capita Revenue is an important

mediation variable. because, do not control per capita national income (model type W), carbon emissions increase the proportion of biofuels consumption. But control per capita country

After People's income (model V), carbon emissions have not significantly increased biofuel elimination fee ratio, but significantly lower biofuel consumption. This indicates that per capita Revenue is an intermediary variable for carbon emissions affecting biofuel consumption. and, when two Country per capita national income same time, High carbon emissions means the country is in industrial A fast-growing period, thus potentially ignoring protection of the environment.

3.5 national income per capita can significantly increase the proportion of biofuels consumption. model V show, When per capita national income doubles, Proportion of biofuels consumption Increase approximately 2 percent. per capita national income to biofuels consumption ratio effect, not only reflects your own environmental dynamics, The also embodies the crop Effect of factors such as yield and emissions.

to analyze the reasons for the above measurement results, Although advanced biofuels are considers to reduce dependency on land, But with current biofuel materials, () arable land resources are still the basis of biofuel development. crop yields and carbon rows The effects of the release of national income per capita, describes the economic development of a country The effect of the level on biofuels consumption is critical. If a national per capita is accepted in level low, Even if the country has a high level of agricultural development, carbon emissions are large, It will not vigorously develop biofuels.

4. Conclusion and discussion

This article describes the To ~ years of global biofuel substitution for fossil fuels The case of is studied, come to the conclusion: biofuels to arable land resources Has a large dependency, The proportion of crop yields and carbon emissions to biofuel consumption positive effects, However, it is necessary to implement the by mediating the per capita national income; Per capita national income has a positive effect on the proportion of biofuels consumption, This effect

Same change trend. (3) using Weibull distribution to analyze different the Wind power density and wind energy density for months, with similar Curves, where

One The maximum wind power density and wind energy density for the month are, whose value is 147.87

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