Case study on Sino-US trade friction-Sino-US photovoltaic dispute

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Abstract
Study on the issue of Sino-U.S trade friction is significant .First of all, Sino-U.S trade friction represents confliction of Vertical Trade between north and south. In second, it is helpful to solve the actual trade disputes. Again, a good solution to Sino-U.S trade friction is of in-depth significance in economy, politics and society.It is known that solar photovoltaic, as a smart economic industry, has been attached importance by main countries in the world in terms of either its manufacturing or its application. Especially for today's China with constant deterioration of smog weather and other environment issues, an extra meaning will be added to the activities to develop and popularize the photovoltaic equipment. China's photovoltaic industry starts not too late but once was developed at low speed, and then with the advent of 21st century, it has been rapidly developed. China's photovoltaic industry has gained international competitiveness in manufacturing technology, industrial structure, and new product development and so on and once made up half the world market. However, the Sino-U.S trade friction initiated in October, 2010 stops this prosperous view all of a sudden in terms of photovoltaic equipment. The paper elaborated the photovoltaic dispute between China and the U.S., with an analysis of the impact of the dispute on markets, employments and governments, etc. of the two nations. It starts with the investigation to the whole story of Sino-US dispute on photovoltaic, and then the influence of Sino-US dispute on photovoltaic. By the analysis in this paper investigates the opposite implication in Sino-US dispute on photovoltaic completely in an empirical way of economic research. From the Sino-US Photovoltaic Dispute case, it's available to find out that the anti-dumping and anti-bribery has brought in much more serious loss to US PV industry than that of China. Actually, though the PV dispute between US and China will guarantee the share of work force in the short term for US, it'll greatly make an influence on the overall amount of trade between China and US and the good opportunity of obtaining the trade surplus from China. Since the trade amount of PV trade between China and US and the development trend seem to have complementary advantage, it has prodigious growth potential. Therefore, the PV trade between China and US will do more good than harm.

Keywords: investigate, anti-dumping, anti-subsidy.

1. Introduction

1.1. Background of Sino-US photovoltaic dispute

The word "photovoltaic" derived from "Photo Voltage Effect", it indicates PD phenomenon that was produced by illumination to different parts of inhomogeneous semiconductor or semiconductor metallic combinations. The new technology photovoltaic solar refers to take advantage of light beam of the sun, according to photovoltaic effect and take solar cell as the storage medium, thus transform solar energy to electric energy; the relative industry is photovoltaic industry and it has large industrial system, mainly includes production and processing of silicon raw material, manufacture of photovoltaic cell, installing and sealing of the modules, photovoltaic power generation system and many other relative links, at the same time, it includes professional equipment manufacturing which is relative to its industry chain. The principle of solar cell is almost similar to normal cells, it is a container of electric energy and it can take advantage of photovoltaic conversion principle to transform radiation beam of the sun to electric energy by semiconductor matters, so solar cell was called "photovoltaic cell"[1].

China's study of photovoltaic cell dated from 1950s and China's own photovoltaic cell was first applied successfully until 1971. While before 1980s, China's photovoltaic industrial development level and output are very low, cost price is expansive and there was not mature market in China, so it was just applied to small power system generally, such as satellite power supply, harbor floating lamp, all kinds of signaling systems, etc., the wattage was limited within double-digit in general.

Since 1980s, part of semiconductor factories in planned economy set out to produce solar cell under extremely rough condition, though the condition was rough and simple, they are pioneers of China's photovoltaic industry to some degree. From the middle and later periods of 1980s to the early and middle periods of 1990s, photovoltaic cell manufacturers from Zhejiang province, Henan province and Yunnan province introduced abroad advanced equipment in succession and built relative production line, China's photovoltaic general capacity had a qualitative leap, so to speak China indeed had its own photovoltaic industry since this time.

In the sixth and seventh five-year plan, China began to concern and support to this burgeoning industry of photovoltaic, part of financial fund injecting and preferential policy implementing made China's weak photovoltaic industry developing rapidly. At the same time, China introduced multi-strip photovoltaic cell production lines from abroad and annual production capacity continues improving and reached 4.5 megawatt per year. Coat price of photovoltaic cell also declined dramatically.

At the end of 1990s, China's photovoltaic industry entered into high-speed development period and introduced new equipment and technology constantly, some projects in all places made China's photovoltaic industry increase in big strides constantly. At this period, a batch of brand-name and high-quality industries turned up, such as TSL, STP, etc., at the end of 2003, the general capacity of China's photovoltaic industry already reached 38 megawatt, but the secret worry can be peeped that China's photovoltaic industry relied on abroad market seriously, most products of China's photovoltaic industry began to rely on abroad exporting.

From 2006 to 2008, in view of photovoltaic industry was restricted by upstream crystalline silicon industry at initial stage, China's photovoltaic industry began to put into production and construction of crystalline silicon at a large scale, it ended China's photovoltaic industry's situation of lacking silicon. At the same time, relevant departments of China Began to introduce many preferential policies of supporting the development of new energy field, such as luminous and wind energy that indicated new energy developing had become a state economic strategy of China.

Benefit by solar energy subsidy policy and price declining of photovoltaic module of European countries, China's photovoltaic industry grew rapidly on 2010, installed capacity of global photovoltaic cells exceeded 17 gig watts in 2010, it is more than doubled. While domestic demand of China's photovoltaic products continued fatigued and weak compared with exporting, installed capacity was just 500 megawatt on 2010 and accounted for 5.7%

of China's photovoltaic cells output, this is foreshadow of subsequent photovoltaic industry crisis of China.

China's photovoltaic industry still developed rapidly on 2011[2]. Full year exporting amount of solar cell reached 22.67 billion dollar, the year-on-year growth rate is 12.3% and China's solar cells became competitive product in international market with a leap; capacity of China's photovoltaic products had accounted for 60% of global general capacity, China became genuine world-class power country of photovoltaic. But good times don't last long, rapid development momentum of China's photovoltaic industry was restricted under internal and external pressure on 2012, the industry grew slow and recovered rational development. Declining tendency of global economic under economic crisis in 2008, European economic downturn, rapid reduction of entire needing of global photovoltaic market and domestic demand downturn of photovoltaic made photovoltaic industries that relied on exporting walk into dilemma, many industries reduced output, stopped production and even closed down [3]. In the first quarter of 2012, inland photovoltaic industries that listed on overseas lost money on every unit, while earnings of inland listing photovoltaic industries were down 33.82% year-on-year, retained profits should decline 99.74% sharply. Top 10 photovoltaic industries of China should debt 17.5 billion dollar in the first half year of 2012. The trade protectionism that China's photovoltaic industries encountered in world-wide more let Chinese photovoltaic industries just like the situation that "cross broken bridge in snowy night and eat ice in winter". STP's declaration of bankruptcy in March 20th, 2013 marked "ice age" of China's photovoltaic industries officially arrived.

Table 1. China PV products export annual data sheet

Year	Exports (US $million)	Export growth (%)
2006	22485.67	34.07
2007	283761.8	11.62
2008	437102.02	54.04
2009	1367997.95	212.97
2010	3052316.4	123.12
2011	3582108.4	17.38
2012	2330821	-34.93

Source: Chinese Department of Commerce

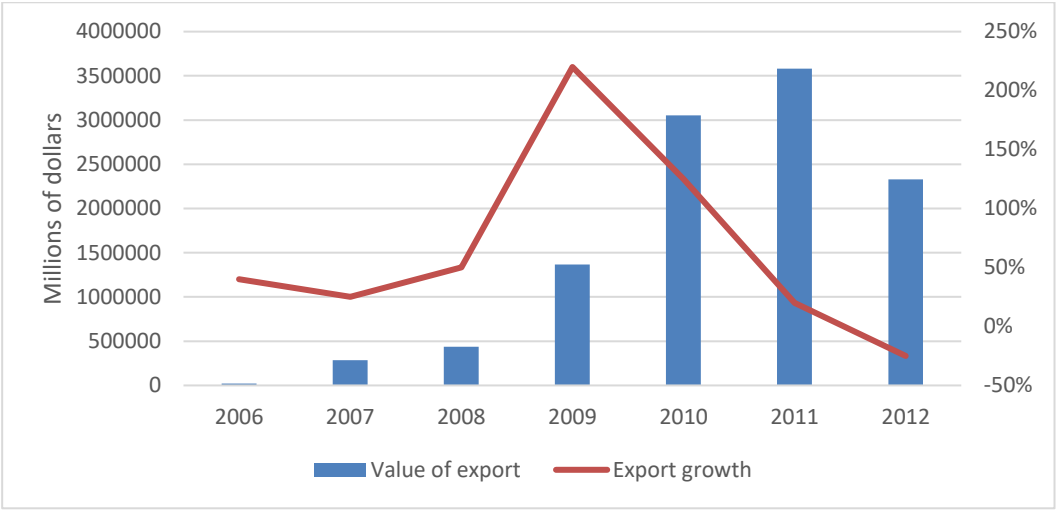

Fig. 1. Annual data of PV products export in China.
Source: Chinese Department of Commerce

Combined with Table 1, Fig. 1 shows quantity and tendency of exporting scale of China's photovoltaic products more visually, they grew rapidly in successive years from 2006 to 2011, at the same time, exporting proportion also increased as double-digit, while the quantity of China's photovoltaic products began decline and grew negatively since 2012.

1.2. Investigate on US Photovoltaic Industries

Though photovoltaic power technology of the U.S. started early, development of photovoltaic industries was not leading as economic strength. The US photovoltaic Industry Association had predicted that photovoltaic generating sets should provide enough electric power for customers and made corresponding plan in 2000. However, the country which indeed realized this prediction was not the U.S., they were Germany and Japan [4]. Their successes and the US failure decision of not investigating let the U.S. lost comparative advantage of competing. The advantages of Germany and Japan were not only reflected in research and produce technologies of photovoltaic industries, but also in investment of researching. Still Obama introduced a series of strategies and polices for encouraging the development of new energy industries since taking office that made the status of new energy industries rise constantly.

In 2004, power capacity of the U.S. was almost gained by electricity generating of traditional fossil energy, while solar installed power-generating capacity had risen to 0.05% of all power capacity until 2008. In recent years, growth rate of utilizing solar energy to generate power is about 40% in the U.S., and because of fittings' cost declining, the cost of solar power system also drops constantly and it made needing rise constantly. Until 2008, solar generating capacity of the U.S. exceeded 3500 megawatt; it can meet the electricity needing of 730 thousand families in the U.S.

There are many tax subsidies and preferential policies of new energy industries especially photovoltaic industry in the U.S. through investigation, in order to support photovoltaic

industry of the U.S., the U.S. Federal Government introduced Advanced Energy Manufacturing Tax Credit, Loan Guarantee Program and Investment Tax Credit, etc., so the degree of new energy industries' supporting of the U.S. is not inferior than China. Take Advanced Energy Manufacturing Tax Credit as an example, it includes 183 clean energy items, cover photovoltaic cell's manufacturing and upper limit of tax credit is 2.3 billion dollars. This plan may pull 7.7 billion dollars for new energy, clean energy and advanced energy industries. Nearly 30 solar energy industries gained over million dollars tax credit under this policy.

The total loan of solar photovoltaic industries reached 13.27 billion dollars during the implementation of Loan Guarantee Program, most guaranteed load flowed to solar photovoltaic industries in the end, the U.S. government spread the risk of energy industries development most and solved cash shortfall in the best way, so to speak the policies like this have significant meaning [5].

I find that the comparative advantages of US photovoltaic industry are production of polycrystalline silicon and manufacture of relative equipment through research, for example, 40% of China's polycrystalline materials were importing from the U.S. in 2011, even most equipment were coming from GT-solar of the U.S., while China has advantages of solar cell manufacturing and assembling such labor intensive industries [6].

1.3. The U.S. point to China's photovoltaic

In fact, the world was caught in economic recession, the U.S. was more caught in crisis center since Obama was in office in 2009, experience indicates that the world economic was more recession, trade protectionism would rise more. The Sino-US trade friction was more severe than 2008 since Obama was in office. Analysis indicated that all kinds of labor unions in the U.S., such as USW was initiator of many Sino-US trade disputes, while the Democratic Party of the U.S. mainly on behalf of the benefits of middle and lower layers, so in order to strive for labor union's votes that influences US political circle most, it must cater the requirement of fulminating China of labor union.

Obama placed high hopes on renewable energy sources filed at the beginning of taking office, he even said that invest 15 billion dollars per year and set about 5 million employment positions in new energy filed in 10 years, insure that new energy generating capacity utilizing reach 10% of the capacity of 2012 and 25% of the capacity of 2025. After substandard loan breaking out, the U.S. hoped pull the US economic from recession by the new filed of clean energy. But there was not good effect in practice. Analysis indicated that the sharp rising of China's photovoltaic industries built-up certain pressure on relative industries of the U.S. and this was the immediate cause of "double inverse". Data shows that the market share of China's photovoltaic products reached 37% of the U.S [7].

USW had presented application to the U.S. that accused China's subsidy policies of inland new energy industries early in September, 2010, this announcement caused the intension of inland economic suddenly, but aroused Chinese dissatisfied and refuted immediately, after long time argument of this issue of both sides, China and the U.S. signed cooperation agreement of multi-new energy fields in beginning of 2011 in Washington, it includes

nuclear power, wind power, solar power and water power. This agreement seems made China's photovoltaic industry was saved.

Three US solar photovoltaic industries declared bankruptcy in 2011; they were Spectra Watt, Evergreen Solar and Polyandry. Polyandry among them was US major supporting industry with hundreds of millions of government guaranteed loan; obviously, it irritated US consensus and Obama administration badly.

The price of photovoltaic products declines constantly since 2011, it formed the main reason of US bankrupting and the general background of blaming China's photovoltaic industry, while Chinese industries were scapegoats of this phenomenon obviously. The U.S. importing about 1.4 billion dollar's photovoltaic equipment of China in 2010. According to incomplete statistics, over 90% of China's exporting products of photovoltaic flowed to European and American market. China has excess foreign trade dependence of photovoltaic industry under the general background of sharp declining of solar cell module price and over surplus of capacity, so it will be a disaster of China's photovoltaic industry once Europe and America set trade barrier to China's photovoltaic products.

2. Progress of Sino-US photovoltaic dispute

2.1. "Double-anti" progress of the U.S. to China's photovoltaic products

German solar world branch of the U.S. united other 6 manufacturers took the lead in revolting China's photovoltaic industry on October, 19th, 2011, it demanded the U.S. government to investigate China's exporting photovoltaic products in "double-anti". US Department of Commerce preliminary decided China's unfair export subsidy of solar photovoltaic products and add levied under 5% (from 2.9% to 4.73%) anti-subsidy duty initially of Chinese solar cell and panel on March, 19th, 2012. Until May, 18th, 2012, it first trialed this case and affirmed that there was anti-dumping behavior of China when exported crystalline silicon photovoltaic cell and modules to the U.S., preliminary decided levy China's 31. 14% to 249, 96% of high anti-dumping duty of exporting solar cell to the U.S. US Department of Commerce announced final judgment on October, 11th, 2012 that levied 34% to 47% of customs duties of China's exporting solar cell and panel products.

The progress of "double-anti" of the U.S. to China's photovoltaic products as follows: on October 19th, 2011, German photovoltaic manufacturer solar world branch of the U.S. formed CASM with 6 photovoltaic manufacturing industries to appeal to US Commerce Department and International Trade Commission and demanded the US government to conduct "double-anti" investigation to the US importing photovoltaic products from China. US Commerce Department registered and investigated CASM's accusing of China's photovoltaic manufacturers officially on November 9th, 2011; the period of investigation was 1 year. On December 2nd, 2011, ITC of the U.S. preliminarily decided "double-anti" of the U.S. to China that the exporting price of Chinese solar cell and module were lower than reasonable price, the reason that damaged US photovoltaic industries was receiving government subsidies of China.

The US Commerce Department would continue the "double-anti" investigation according to trade remedy procedure of the U.S. On January 30th, 2012, the US Commerce

Department made urgent order in "double-anti" of China's photovoltaic products and decided retroactive application of anti-subsidy duties, it would levy since 90 days before after preliminary deciding anti-subsidy tax rate. On March 20th, 2012, the preliminary decision of US Commerce Department affirmed the subsidy fact of Chinese government's subsidy to photovoltaic manufacturers and levied China lower than 5% of punitive tax rate of exporting photovoltaic products to the U.S., it was below general expectation.

On May 18th, 2012, the US Commerce Department announced the preliminary decision of anti-pumping investigation of China's photovoltaic cell and module; they thought there was dumping phenomenon of China's manufacturers that produced crystalline silicon and module in the U.S. and preliminary decided to levy China 31.14% to 249.96% of anti-dumping tariff to above products. So the summation of "double-anti" tax rate reached from 34.04% to 254.69%. On October 10th, 2012, the US Commerce Department made final decision to Chinese exporting photovoltaic products and levied 14.78% to 15.97% anti-subsidy duty and 18.32% to 249.96% of anti-dumping duty. The specific object of taxation includes crystalline silicon photovoltaic cell, panel, laminated board, faceplate and materials of building integration from China. On November 7th, 2012, the US Commerce Department made final decision and affirmed China's exporting crystalline silicon photovoltaic cell and module damaged relative industries of the U.S. substantially, the U.S. would levy anti-dumping and anti-subsidy tariff to this kind of products. On December 7th, 2012, the US Commerce Department ordered to levy tariff to China's exporting solar cell since December 7th; the period was 5 years at least. In addition, the US Commerce Department indicated that lower the dumping margin of STP from 31.73% to 29.14% in declaration.

On December 25th, 2013, White House and US Department of Defense introduced a new deal that prohibit purchasing China's photovoltaic modules and using for military base of the U.S., while can they purchasing photovoltaic modules from the U.S. or other countries which signed FTA.

On January 23th, 2014, the US Commerce Department announced starting "double-anti" investigation to China's exporting crystalline silicon photovoltaic products and at the same time, starting anti-dumping investigation to Taiwan's exporting crystalline silicon photovoltaic products.

2.2. China's fighting progress against trade protection of the U.S.

At the beginning of "double-anti" registration of US Commerce Department and ITC to China's photovoltaic products, China's Ministry of Commerce had expressed deeply concerned to this case and seek solutions positively. Under the organization of chamber of import and export trade of Chinese mechanical and electrical products, 14 Chinese photovoltaic industries were united to fight against "double-anti" of the U.S. and delegated Sidley Austin to debate. Operational guidance unit of chamber of import and export trade of Chinese mechanical and electrical products was just Commerce Department. While many photovoltaic industries of the U.S. were also opposed to "double-anti" definitely, photovoltaic apply industries of the U.S. include Recurrent Energy, Solar City, and Sun Run, as well as manufacturing industry MEMC and Westinghouse Solar. Above-mentioned

industries formed a new alliance “Coalition for Affordable Solar Energy (CASE)” with Suntech, Yingli and Trina of China. The Alliance announced the plan that “urge policy maker to provide solutions for above trade disputes”.

The case turn around for a time under the effort of Commerce Department and relative industries of China and put off the registration of “double-anti”, while US Department of Commerce and International Trade Commission firmed respectively that there were dumping in Chinese photovoltaic industries and accepted improper subsidy of Chinese government finally and it damaged to US relative industries, so they carried out “double-anti” to Chinese photovoltaic products, in this time, counter measures of China were also updating from verbal advice to counter, it may be said rational, beneficial and polite.

On November 9th, 2011, Commerce Department of China showed dissatisfy to the trade friction that the U.S. provoked and Chinese government showed serious concern to that. On November 25th, 2011, Commerce Department of China started trade investigation that aimed at renewable energy subsidy polices of the U.S. and was considering appealing to WTO. On November 29th, 2011, leaded by chamber of import and export trade of Chinese mechanical and electrical products, Yingli, Suntech and other 12 photovoltaic industries of China issued a joint declaration about US anti-dumping and anti-subsidy (“double-anti”) investigation of Chinese solar products in Beijing to illuminate the standpoint and solutions of Chinese photovoltaic industries. On June 26th, 2012, GCL Silicon, LDK, Luoyang Silicon and DQ represented domestic solar grade silicon industries to put forward to levy anti-dumping and anti-subsidy tax for US polycrystalline silicon manufacturers. On July 20th, 2012, Commerce Department of China decided to carry out anti-dumping investigation of US and Korean polycrystalline silicon. On July 18th, 2013, Commerce Department of China preliminary reported the solar grade silicon which originated in the U.S. and Korea existed dumping behavior. Dumping margin of the U.S. and Korea was from 2.4% to 57%. On January 20th, 2014, the State Council Customs Tariff Committee decided to levy anti-dumping tax to solar grade silicon that originated in the U.S. and Korea from this date and the deadline was 5 years.

3. Influences on Sino-US photovoltaic dispute

3.1. Influences on photovoltaic exporting of China

It influenced exporting market of the U.S.

After international financial crisis breaking out, every main economic entity in the world placed hopes on the development of high and new technology industry and waking on the way of sustainable development, in order to get rid of current economic plight, transfer domestic discontent emotion and guarantee dominant right of international economy in the future, the U.S. placed high hopes on strategic emerging industries, while the method of trade protection that developing domestic relative industries turned into one option. Production value of Chinese clean energy was over 64 billion dollars in 2010 and occupied the world first, while the US was 45 billion dollars. At present, process scale of Chinese solar photovoltaic cell panel among the highest in the world. Evaluated by data in 2011, the amount of money involved in the case of this photovoltaic disputes reached 3.1 billion dollars, it occupied about 10% of the total exporting amount of this product of China at the

same term, the “double-anti” investigate this time would influence 61 Chinese photovoltaic industries.

Industrial divisions of photovoltaic manufacturing industry include manufacturing of silicon material, cell, module, etc. The “double-anti” of the U.S. aimed at Chinese photovoltaic cell or relative module products. That was only adopted Chinese photovoltaic cell modules, would they meet with anti-dumping tariff. That provided certain space to avoid “double-anti” this time for Chinese actually, it was reported that TSL and Yingli bulk purchased relative modules from Taiwan to avoid anti-dumping tariff of the U.S.

In fact, because the price of solar cell from Taiwan was low and capacity factor was high, so Taiwan had formed certain cluster competitive advantage on manufacturing of solar cell; the low price of photovoltaic cell of Taiwan made inland industries purchase its solar cell with large-scale and released capacity to bring cost down. Chart 4 shows that the combination of photovoltaic industries of Chinese mainland and Taiwan is deeper and deeper in recent years. In addition, according to the data of CIC consulting, amount of solar cells that Chinese mainland purchased from Taiwan was about 3 gig watts in totally, occupied 30% of total shipment of Chinese mainland photovoltaic industries.

Table 2. .2010-2012 China and Taiwan's exports to the United States related to the value of anti-dumping cases.

Countries and regions. Amount ($100 million)	2010	2011	2012
China	15.2	31.2	20.8
Taiwan, China	3.4	2.6	5.1

Source: Chinese Department of Commerce

But good times don’t last long, on December 31th, 2013. German solar world branch of the U.S. represented US domestic industry to apply to US Commerce Department and International Trade Committee that carry out anti-dumping and anti-subsidy investigation for solar cell products from Chinese mainland and Taiwan. While the application this time had great influence on solar cell of Chinese mainland and Taiwan and further pulled up the price of Chinese photovoltaic products that made Chinese photovoltaic products lose advantages in US market more.It influenced the exporting market of the world.

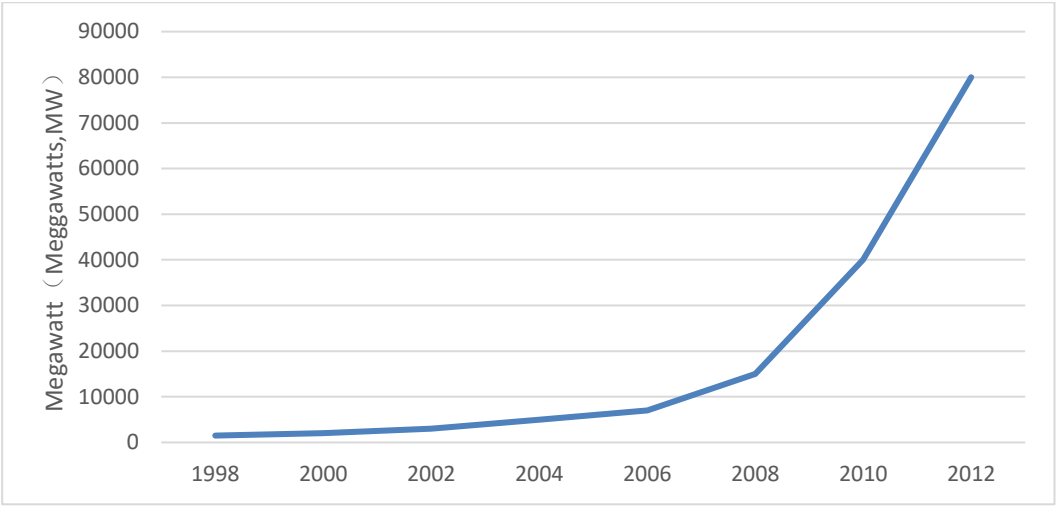

Fig. 2. World solar photovoltaic battery installed capacity
Source: Chinese Department of Commerce

In general, the world photovoltaic market began shrink since 2012, Chinese photovoltaic industries was also got into trouble accordingly; Chinese photovoltaic industries placed high hopes on US photovoltaic industries with gradual withdrawing of European subsidy policy, while the "double-anti" investigation of the U.S. to Chinese photovoltaic industries indeed covered a shadow to Chinese photovoltaic industry that was in trouble. Chart 2 shows that world photovoltaic market increases rapidly from 2006 to 2010 that was glorious 5 years of Chinese photovoltaic industries, amount of Chinese photovoltaic products exports increases as 317.23% per year. Just the Subprime Crisis of the U.S. in 2008 and breaking out and spreading of European Debt Crisis made needing of European and American market to photovoltaic products decline straightly, at the same time, Chinese exporting amount was also declined. Chart 5 shows that gross export amount of Chinese photovoltaic products was 35.821 billion dollars in 2011 and growth rate was just 17.38, it is inferior by comparing with 5 years ago. It is more dismal in the first half year of 2012, gross export amount was just 12.894 billion dollars, and there were negative growth and obvious downturn trend, it is amazing that the amount had fallen 31.49% compared with 2011.

Table 3. China PV export statistics (2006 - 2012)

Year	Exports (US $million)	Export year-on-year (%)
2006	22485.666	34.07
2007	283761.796	11.62
2008	437102.016	54.04
2009	1367997.95	212.97
2010	3052316.4	123.12
2011	3582108.4	17.38
2012	2330821	-34.93

Source: Chinese Department of Commerce

Chinese photovoltaic faced huge overcapacity in 2013. Data shows that net unit billing of Chinese photovoltaic industries was 11.5 gig watts since the first half year of 2013, while domestic capacity reached 40 gig watts and it means that the condition of structural excess capacity was still obvious. Affected by trade friction, export amount of Chinese photovoltaic products decline 30.97% to 6.522 billion dollars in the first half year of 2013, main reason was the export price declined 41.07%, but amount increased 17.02%.

3.2. Influence on employment of China

Photovoltaic power [8] generation industries can provide vast and important employment opportunities. Installation stage can create vast employment positions to advance the development of local economic and prompt social stability. According to information of European photovoltaic power generation, every megawatt production of solar cell would create 10 employment positions, while every megawatt installation would create about 33 employment opportunities. Middle links such as selling would create 4 to 6 stations. Thus every megawatt capacity of solar photovoltaic would create almost 50 employment positions. Although improvement of technology would promote process automation in the predictable future and lower the figure between them, as a fund-intensive and labor-intensive industry, the motion of employment should not be taken lightly. Total production of solar photovoltaic [9] was about 32 gig watt in 2011 and photovoltaic industry hold employment over millions people. Table shows that Chinese unemployed population staying at a high level in recent years, while Chinese photovoltaic industries could hold vast social employment; so to speak it solved employment issues of China greatly.

A report of World watch institute in 2011 indicates that China would create 6680 direct solar photovoltaic jobs from 2011 to 2020, so employment of relative industries would increase more. While “double-anti” of the U.S. to China certainly would affect employment of Chinese photovoltaic industry, because of lacking of Chinese relative statistic data that affect estimation, so there are not correct statistics at present.

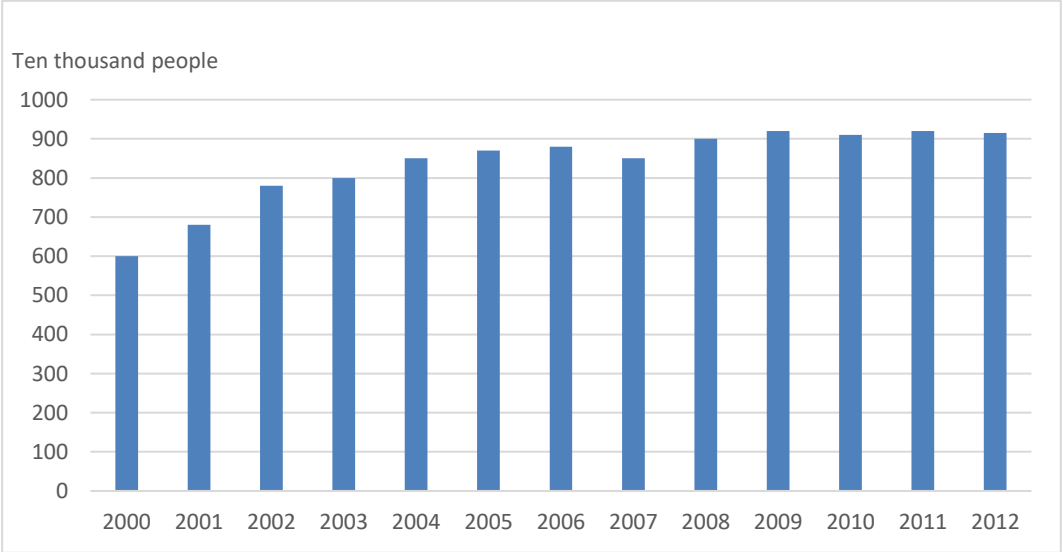

Fig. 3. The number of urban registered unemployed people
Source: Ministry of human resources and social security of China

3.3 Negative Effects on Economic and Trade to Two Countries

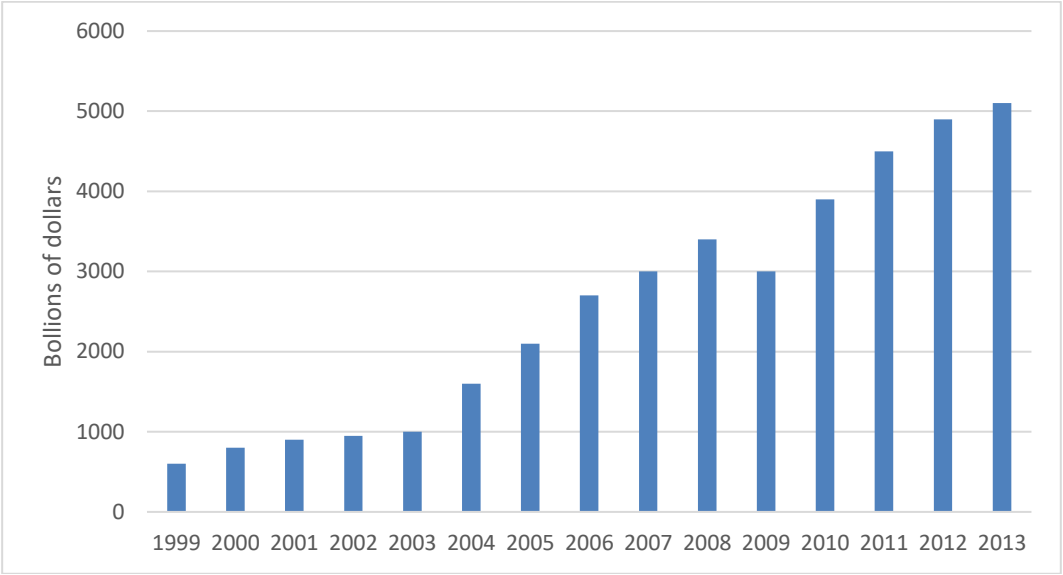

Fig. 4. 1999-2013 Sino US trade statistics
Source: Chinese Department of Commerce

Figure shows that China's foreign trade keep rapid increasing since accessing to WTO, while China's total import and export value reached 4.16 trillion till 2013 and goods trade excess the U.S. and occupied the world first. Sino-US Trade value increases rapidly in recent years, the U.S. is the second big trade partner of China and the first big trade country which second to EU, Sino-US trade occupies distinctly important status in China's foreign trade. Data of China's Ministry of Commerce shows that the proportion of China's export value to the U.S. account for total China's export value was stable about 20%. Influenced by economic crisis, the proportion slightly decreased in recent years, but it still kept over 15%; trend of Sino-US trade friction were these years and photovoltaic dispute was the typical example. According to statistics, double-anti of photovoltaic this time influenced almost 2.5 billion dollars trade value of Sino-US.

While according to data in 2011, solar relative products and total trade value of service reached 600 million dollars in foreign commercial intercourse of clean energy of Sino-US. As shown in Figure.

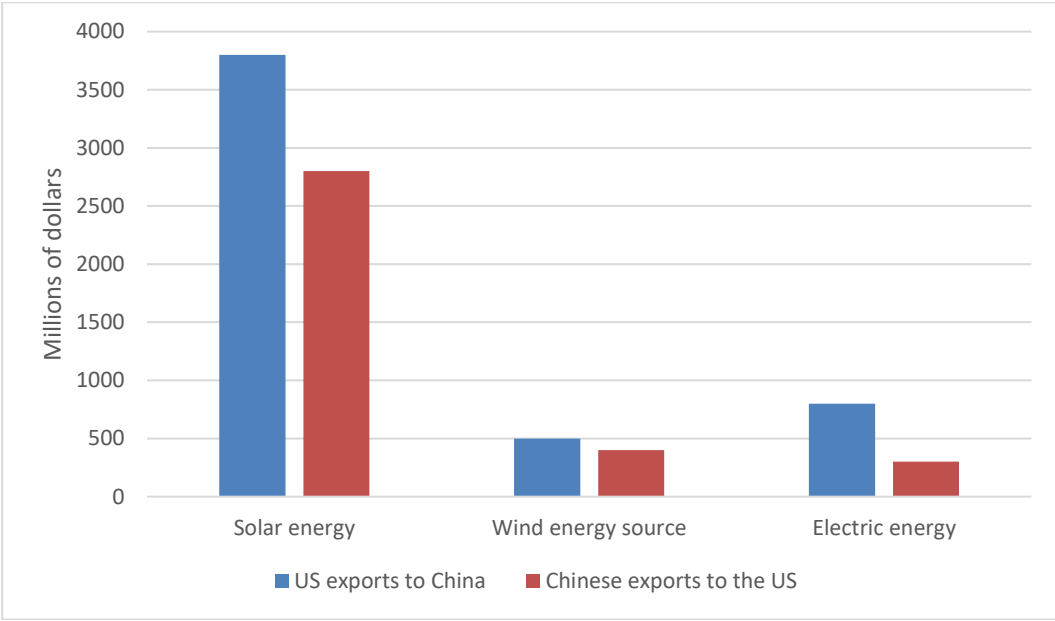

Fig. 5. Clean energy exchanges between China and the US in 2011
Source: Chinese Department of Commerce

Importing solar cell account for about 95% of China's exporting solar products and service to the U.S. in Sino-US solar products and foreign trade service. It just explained that China's advantages of photovoltaic industries were volume-production and large-scale package of solar photovoltaic cell. While competitive advantages of the U.S. were production of raw material crystalline silicon and high-technology equipment, necessary modules of solar products, etc. Price of polycrystalline silicon that the U.S. exporting to China was 68.4 million dollars in bilateral trade of photovoltaic cell products, only MEMC electronic material enterprise of the 5th great world polycrystalline silicon had exporting polycrystalline silicon and silicon slice that valued about 28.9 million dollars to China. So to speak that the double-anti this time brought very bad influences to Sino-US economy and trade relationship.

4 Influences of dispute to the U.S

4.1. Influences on US photovoltaic market

In recent years, the development of US photovoltaic market is one of the fastest photovoltaic markets in the world. Chart 6 shows that newly increased installed capacity of US solar power system explosive increasing in recent years, the year-on-year growth of US photovoltaic industry market was 140% in 2011 and it also was the fastest of the industries development of US national economy. While installed industry of solar panel contributed most and the growth rate was over 90%. It is worth mentioning that the price declining of crystalline silicon was one of the reasons of this industry developing rapidly, price of photovoltaic cell had fell 50% year-on-year just in 2011. In the aspect of foreign exporting and importing, net export value of relative products of US solar was 200 million dollars according to the data in 2010 and it was flatted with China basically.

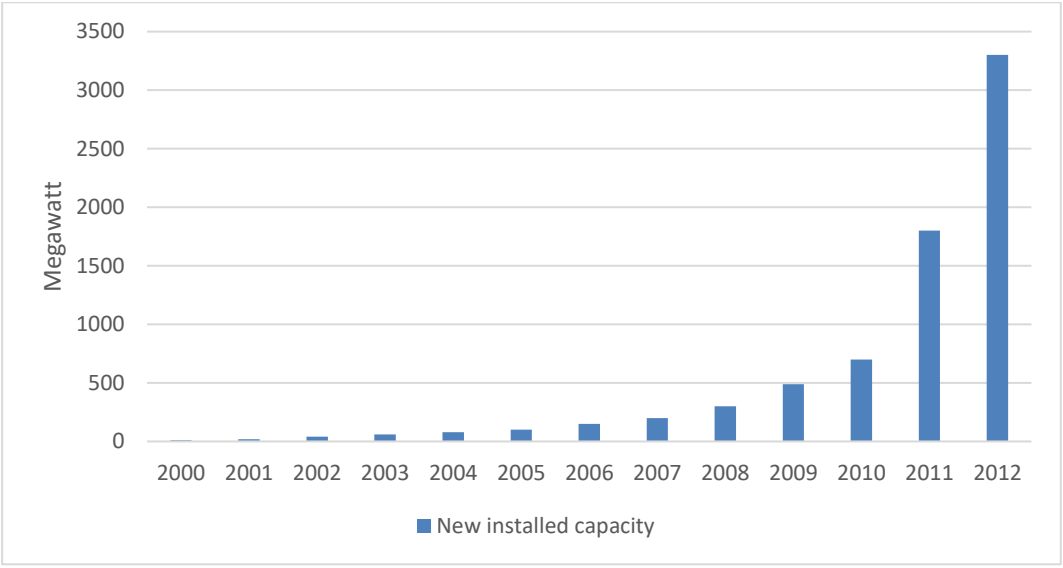

Fig. 6. 2000-2012 new installed capacity of solar power in the United States
Source: U.S. Department of Commerce

According to a recent investigation of US solar photovoltaic industry association, the U.S. just accounted for about 10% of Chinese photovoltaic exporting market in 2010, while export amount of solar photovoltaic panel production equipment and raw material of the U.S. to China was far more than import amount of US solar photovoltaic panel China; the U.S. earned almost 2 billion dollars of favorable balance of photovoltaic product trade.

It can be said that photovoltaic double-anti of the U.S. to China belongs to a classical example of cutting off your nose to spite your face, on the one hand, cheap photovoltaic products of China benefited most customers of the U.S. and greatly lowed their installed price of photovoltaic products; on the other hand, active demand of Chinese photovoltaic industry to US polycrystalline silicon and relative equipment would further stimulate the development of US photovoltaic industry.

4.2. Influences on US employment

Rapid development of US photovoltaic industry had fully positive effect on promoting US employment. US solar power generation industry employed 157 hundred labor powers in total in 2006. US solar photovoltaic industry employed over 100 thousand people in 2011 and increased 6.8% compared with 2010. At present, there are over 5600 solar relative industries in the U.S. and most of them are middle and small-sized enterprises, they made a great contribute to the employment of photovoltaic industry.

The statistical report from Solar Foundation shows that about 142698 US people were employed by photovoltaic industries till 2013, 23682 people among them were contained in new created employment positions compared with 2012, increased 19.9% of job opportunity year-on-year, while increasing rate of US employment was just 1.9% at the same time and formed sharp contrast; that is the speed of increasing job opportunities of photovoltaic industry excess 10 times of average level of other US industries.

The huge trade amount of Sino-US photovoltaic products and the condition of complementing each other's advantages made great growth potential. Double-anti of the U.S. to Chinese photovoltaic products must would lower the photovoltaic products needing of China to the U.S., possible trade retaliation measures of China were likely to keep off US relative photovoltaic products from China, by this concern, CASE formed by the biggest photovoltaic industries entrusted The Brattle Group provided a report to predict possible impact of this case of US photovoltaic industry, the report indicates that if levy 50% tariff of Chinese photovoltaic products, employment positions would decrease 14877 to 43178 from 2012 to 2014; while if levy 100% tariff, the figure would be 16917 to 49589. And net income reduction of US photovoltaic industries would be 621 million to 2.6 billion dollars.

4.3. US Government's pressure from public opinion

Above text analyzed that the "double-anti" of the U.S. to Chinese photovoltaic products is classical example that make things worse and possible to damage the benefit of domestic photovoltaic relative industries of the U.S., so there were always opposed voices. CASE [10] is an organization with great impact in US photovoltaic industries; the members include manufacturer firms with great impact in US photovoltaic installed and explore industries, such as Gro Solar, Recurrent Energy, Solar City, Sun Run, MEMC/Sun Edison, Westinghouse, etc., they bitter against double-anti at the beginning of the alliance founding and thought the short-sighted behavior of the U.S. would make employees of US photovoltaic industries unemployed.

However, GPEC worried about that double-anti would influence 5000 positions provided by 980 photovoltaic industries in Arizona, while President Mark StephenWrighton of University of Washington in St. Louis once said that not all the US industries were approving US government's punitive measure which aimed at China, in fact, quite a part of US photovoltaic industries opposed to the decision of US government. Many environmental protection organizations in the U.S. also thought that "double-anti" investigation of Chinese photovoltaic cells would affect the application of this new energy in the U.S. thus put off the development of new energy and influence competitive power of the U.S.

5.Conclusion

According to the case of PV dispute between China and United States, it's easy to find out that United States has unscrupulously taken action to keep its self-owned advantage in the emerging strategic industry. From the case, it's available to find out that the anti-dumping and anti-bribery has brought in much more serious loss to United States PV industry than that of China. Actually, the behavior of United States seems unwise. Though the PV dispute between United States and China will guarantee the share of work force in the short term for United States, it'll greatly make an influence on the overall amount of trade between China and United States and the good opportunity of obtaining the trade surplus from China. Since the trade amount of PV trade between China and United States and the development trend seem to have complementary advantage, it has prodigious growth potential. Therefore, the PV trade between China and United States will do more good than

harm. In this case, it has reflected the short-sighted behavior and utilitarian trends of United States.

References

[1]Ding Yiwei (2011), Study on Chinese photovoltaic industry competitiveness [D] Changsha: Hunan University.
[2]Chinese photovoltaic industry development report 2011-2012.
[3]Dan Shi (2012), Crisis and outlet of chinese photovoltaic industry under the American and European "Twin lens reflex" [J] International Trade, (12):16.
[4] Chu Wenbo, Jiang Tao (translated and edited by) (2010), Roadmap of American photovoltaic industry[J] market economy and price, the 11th phase.
[5]Li Gang (2013), Study on countermeasures of Chinese "Twin lens reflex" in photovoltaic industry based on price competitiveness, Priced Monthly Magazine, the 1st phase.
[6]Jiang Hua (2012), Chinese industries should not pay for American photovoltaic waterloo [J] solar energy, the 22th phase.
[7]Li Pei, Yu Pei (2012), A brief analysis of Chinese "Twin lens reflex" in photovoltaic industry and countermeasures [[J] Chinese Collective Economy, the 15th phase.
[8]Chinese photovoltaic development report 2007.
[9]Zhao Yuwen (2011), Developing state, trend and reflect on photovoltaic industry [j] solar industry forum, the 18th phase.
[10]Polaris (2011), The American affordable solar alliance was established [N] China Energy News.