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SUPPLY RESPONSE OF WHEAT AND BARLEY IN IRAQ

TALEB ALI GAWAD

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SUPPLY RESPONSE OF WHEAT AND BARLEY IN IRAQ

By

TALEB ALI GAWAD

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of Requirements for the Degree Master of Science

December 2014

DEDICATION

I dedicate my dissertation work to my family, special feeling of gratitude to my mother whose words of encouragement and a push for tenacity ringing in my ears. My brother Saad, has never left my side and is very special thank to my ministry, (ministry of agriculture) for being there for me throughout the entire master program.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirements for the Degree Master of Science

SUPPLY RESPONSE OF WHEAT AND BARLEY IRAQ

By

TALEB ALI GAWAD

December 2014

Chairman: Ismail AbdLatif , Phd

Faculty: Agriculture

Iraq's agricultural sector employs more than 30% of the population and it is the main source of food for the population as well as animal feed. It also provides raw material for processing for many industries in Iraq. Wheat and barley can be considered as the most important major cereal crops in Iraq and the world for being the main food crops for the majority of the world's population, and its strong strategic relationship to food security. In Iraq, cereal production has been marked by fluctuations during 1980-2011 with an average annual production of 2,364 thousand tons, ranging from the highest production of 2,586 thousand tons in 2002 and the lowest production of 1,099 thousand tons in 1984. This fluctuation in production is due to several different reasons, including water scarcity, low rainfall, and not encouraging pricing policies and because of political circumstances. All these variables caused the reducing in the production of many crops, especially wheat and barley production in Iraq. Many variables affect the supply response on crops, the majority of the researchers usually focused on price and non-price variables, but they had not specified the kind of the irrigation. It can be clearly seen in this study was specified the kinds of irrigation for two kinds of irrigation firstly the irrigation by the river and secondly the irrigation by the rainfall, as well as the auto-regressive distributed lag Model (ARDL), Bounds testing approach to Co integration and the error correction model applied in this studythe auto regressive distributed lag (ARDL)model(Pesaran, Shin, & Smith, 2001). Production of wheat and barley was represented the dependent variable and the cultivated area, irrigation and crop price was represented the independent variables (explanatory variables). The unit root test was applied to understand these variables were stationary or not stationary by the ADF (Augmented Dickey-Fuller test).From ARDL, the F-statistic was used to test for Co integration between the variables. The long-run and the short-run relationship between the variables were then identified. Results indicated that barley area and its determinants; the relative price of wheat is Co integrated. The results also indicated that barley acreage is responsive to domestic price. This implies that price can be used as instruments to maintain favourable planted area. The result of production for barley irrigated by river (PRIB) and rain (PRAB) with an F-statistic of 11.9 and 12.03 respectively, and significant at 1 %. For wheat crop the F-statistic7.09 and 9.67 respectively. That implies that there is Co integration between the variables. For long-run and short-run periods, there is a

significant effect for cultivation area and irrigation on the production while price also has a significant effect on the production in the long run. In conclusion, cultivation area, irrigation and crop prices have significant impacts on the production in the long run. Thus, the government should introduce policies which have significant impact on production by using a new system of irrigation and use new technology to extend the area planted and at the same time create a price policy to increase the production of wheat and barley.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains

SAMBUTAN BEKALAN GANDUM DAN BARLI UNTUK TEMPOH DI IRAQ.

Oleh

TALEB ALI GAWAD

Disember 2014

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Sektor pertanian di Iraq mempunyai lebih daripada 30 % penduduk dan ia menjadi sumber utama makanan bagi penduduk tempatan dan juga sebagai makanan haiwan. Ia juga menyediakan bahan mentah untuk proses pembuatan bagi kebanyakan industri di Iraq. Gandum dan barli boleh dianggap sebagai tanaman utama bijirin yang sangat penting di Iraq dan dunia berikutan keutamaan makanan bijirin bagi kebanyakan penduduk seluruh dunia selain mempunyai hubungan strategic terhadap keselamatan makanan .Di Iraq , pengeluaran bijirin telah menunjukkan pergerakan semasa dari tahun 1980 - 2011 dengan pengeluaran tahunan purata sebanyak 2,364 ribu tan , dari pengeluaran tertinggi 2586 ribu tan pada tahun 2002 dan pengeluaran yang paling rendah daripada 1,099 ribu tan pada tahun 1984 .Pergerakan turun naik dalam pengeluaran berlaku disebabkan oleh beberapa keadaan yang berbeza, termasuk kekurangan air, jumlah hujan yang rendah , dan dasar harga yang tidak menentu dan disebabkan oleh keadaan politik . Semua pembolehubah ini boleh menyebabkan kekurangan dalam pengeluaran pelbagai jenis tanaman, terutamanya pengeluaran gandum dan barli di Iraq .Banyak pemboleh ubah mempengaruhi tindak balas penawaran terhadap tanaman, majoriti para penyelidik biasanya akan memberi tumpuan kepada pemboleh ubah harga dan bukan harga, tetapi mereka tidak menyatakan jenis pengairan. Ia boleh dilihat secara jelas dalam kajian ini menspesifikasikan dua jenis pengairan antaranya, pertama pengairan oleh sungai dan kedua pengairan melalui air hujan , serta juga sebagai Auto regresif Distributed Lag (ARDL) Model, pendekatan Bounds Test kepada Ko-Integrasidan Model Pembetulan Ralat yang digunakan dalam kajian Auto regresif Distributed Lag (ARDL) Model. Pengeluaran gandum dan barli mewakili pembolehubah bersandar manakala kawasan, pengairan tanaman dan harga yang ditanam mewakili pembolehubah bebas (pembolehubah penerangan) . Ujian Unit Akar (Unit Root Test) telah digunakan untuk memahami pembolehubah ini adalah bergerak atau tidak bergerak oleh ujian Augmented Dickey - Fuller (ADF) .From ARDL , F- statistic telah digunakan untuk menguji ko-integrasi antara pembolehubah . Hubungan jangka panjang dan jangka pendek antara pembolehubah telah dikenalpasti. Keputusan menunjukkan bahawa kawasan barli dan penentunya; harga relatif gandum mempunyai hubungan. Dapatan juga menunjukkan bahawa keluasan barli adalah responsif terhadap harga tempatan . Ini menunjukkan bahawa harga boleh digunakan sebagai alat untuk mengekalkan kawasan tanaman tumpuan. Hasil pengeluaran barli diairi oleh sungai (PRIB) dan

hujan (PRAB) dengan F – statistic sebanyak 11.9 dan 12.03 , dan gandum mempunyai signifikasi pada tahap 1% dengan F-Statistik sebanyak 7.09 dan 9.67 . Keadaan tersebut menujukkan bahawa terdapat ko-intergrasi di antara pembolehubah. Bagi tempoh jangka masa panjang dan pendek ,terdapat kesan signifikasi terhadap kawasan penanaman dan pengairan terhadap pengeluaran manakala harga juga mempunyai impak besar ke atas pengeluaran dalam tempoh jangka masa panjang. Kesimpulannya, kawasan penanaman, pengairan dan harga tanaman mempunyai signifikasi ke atas pengeluaran dalam jangka masa panjang. Oleh itu, kerajaan perlu memperkenalkan dasar-dasar yang mempunyai impak besar ke atas pengeluaran dengan menggunakan sistem pengairan dan teknologi baru bagi memperluaskan kawasan tanaman dan pada masa yang sama mewujudkan dasar harga untuk meningkatkan pengeluaran gandum dan barli .

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For Dr.NolilaMohdNawi for serving on my thesis committee.Finally, I owe my deepest gratitude to all those who have helped me with my work, especially my mother who has been more than a help but a joy throughout my graduate program that made this work a success.

I certify that a Thesis Examination Committee has met on 1 December 2014 to conduct the final examination of Taleb Ali Gawad on his thesis entitled "Supply Response of Wheat and Barley in Iraq" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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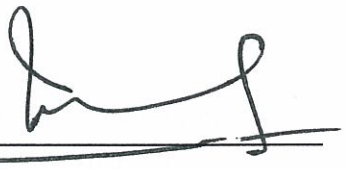
Signature: 
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LISTOF ABBREVIATIONS

PRIB	barley production irrigated by river
CARIB	Barley cultivated area irrigated by river
River	Irrigation by river
PB	Price of barley crop.
PRAB	Barley production irrigated by rain
CARAB	Barley cultivated area irrigated by rain
ARAPRB	Barley production irrigated by rain
PRIW	Wheat production irrigated by river
CARIW	Wheat cultivated area irrigated by river
PRIW	Wheat production irrigated by river
PW	Price of wheat crop.
PRAW	Wheat production that irrigated by rain
CARAW	Wheat cultivated area irrigated by rain
ARA	Wheat irrigated by rain
PW	Price of wheat crop

CHAPTER 1

INTRODUCTION

This chapter discusses the background of the study, problem statement, and the purposes, definition of terms, the significance and the limitation of the study.

1.1 Background of Study

Wheat and barley are the most important major cereal crops in Iraq and the world for being the main crops that represents food for the majority of the world's population. And it is an important strategic crop and with a strong relationship to food security. However, all cereal crops are annual crops, means they completed their life cycle in one season and mostly grown in winter season, or spring season. Iraq's agricultural sector employs more than 30% of the population and it is the main source of food for the population as well as animal feed. It also provides raw material for many industries in Iraq. The rate of increase in population growth and per capita income in Iraq, including the multiplicity of the food industry led to increased demand for agricultural products. The increase demand for agricultural productivities requires the use of production resources effectively and efficiently by decision makers and agricultural producers The role of Government in allocation of resources will significantly affect the decision making process at the producer level (Dorward, Kydd, Morrison, & Urey, 2004).Therefore, the formulation and implementation of agricultural policies will have a significant impact on agricultural production. Hence the question about the extent of the growth of the supply of agricultural products and the same time the level of demand for these products. This may include the development of agricultural productivities, technological development and institutional framework for the agricultural sector, as well as dealing with the supply response of agricultural products in the case of price change factor and non-price factors like irrigation and cultivated area (Roling & Wagemakers, 2000) . Price is very important in determining the profit or loss of the farming activities. Where the market price leads to profit, it may provide an incentive for producers, and encourage the growth and development of agricultural productivities in Iraq (Chapagain, Hoekstra, & Savenije, 2006). The price changes in the long-run may have an impact on the production in the agricultural sector, thus, price is of great importance, and there is a need to formulate effective agricultural policy in order to achieve sustainable economic growth. Therefore, the government has an important role to play, in the determination of prices and market operations, producers responses to prices, in order to achieve a balance between supply and demand in the market. The existence of a good policy framework is very important. The pricing policy is not enough incentive to farmers to increase agricultural production, to achieve the desired objectives. There are non-price factors which can serve as an incentive to the producers (such as irrigation, fertilizers, seeds, pesticides) and these leads to increase production and yields. Several studies reported that farmers can be affected by other non price variables (Rao, 2006). Hence the study of farmers' supply response to price and non-price is a herculean task. In this

study, we will take wheat and barley as the most important cereal crops in Iraq and examine the supply response to them.

1.2 Issues and challenges

Generally wheat and barley production in Iraq is very important, because of the value people attached to these crops, as a source of food and income to farmers. Agricultural production play an important role in the economy of any country as it relates to the lives of its population firstly as a source of food and secondly sources of economic activity (Benjaminsen, 2001).The grain crops are of great importance to the stability and progress of human beings, for these crops make one-third of the dry matter and about half of the amount covered by the protein in human nutrition, and contains 83% carbohydrates and the proportion of protein is between (6.5 – 18%), while the content of fat varies between (1-5%) and constitute a major source of energy (calories), and is generally a good source of minerals, especially calcium, being rich in vitamins, especially B group. Wheat is one of the most important food crop in the world because it is the primary source of bread, one of the winter crops, has averaged global area for the period 1980-2011, with 223 million hectares and global production averaged 560 million tons with a global average productivity of 2.511 tons / ha, as in Table 1.However, the most important producing countries are China, the United States and India (Welch & Graham, 2004). The Arab countries that produce wheat are Egypt, Morocco, Syria and Iraq. The average production in Iraq was 1.26 million tons (Watson, 1974).This is low compared to neighboring countries. Turkey's production reached about 18.85 million tons and Iran amounted to about 9.67 million tons and Syria amounted to 3.04 million tons (Bazza & Najib, 2003; Johnstone & Mazo, 2011; Reid, 1992), as shown in Figure 1.

Table 1: Area, Production and Productivity of Wheat Crop in Selected Countries of the World for the Period 1980-2011

Country	Area	Production	Productivity
China	27.52236	95.21830	3.460
USA	23.90600	61.74312	2.583
India	25.06118	59.06467	2.357
France	4.99645	32.39923	6.484
Canada	11.64090	25.07003	2.154
Turkey	9.17879	18.85725	2.054
Germany	2.67295	17.90548	6.699
Australia	10.99844	17.28805	1.572
Pakistan	7.94719	16.43005	2.067
Iran	6.27078	9.67295	1.543
Romania	2.15841	5.84185	2.707
Spain	2.20203	5.33094	2.421
Egypt	0.88617	4.93964	5.574
Mexico	0.84348	3.66655	4.347
Denmark	0.52030	3.65028	7.016
Brazil	2.18680	3.52727	1.613
Morocco	2.49698	3.16957	1.269
Syria	1.48127	3.04061	2.053
Saudi Arabia	0.48310	2.21371	4.582
Iraq	1.39962	1.26616	0.905
Tunisia	0.79268	1.10823	1.398
Japan	0.21129	0.74652	3.533
Sudan	0.21563	0.38899	1.804
Libya	0.17529	0.14004	0.799
Lebanon	0.03202	0.07508	2.345
Kuwait	0.00011	0.00022	1.998
World average	223	560	2.511
Lowest value	0.00011	0.00022	0.799
Highest value	27.522	95.218	7.016
Standard deviation	7.934	22.875	1.768

Area in million hectares, million tons production, productivity t / ha
(Source: FAO statistics-FAO STAT-groups (2012))

Moreover, as for barley, it is one of the top winter forage crops of the grass family, and in the past was of great nutritional importance and global area averaged for the period 1980-2011, with 67.27 Million hectares. Meanwhile, the average global production is 155 million tons, while average productivity of 2.30 t/ha, as in Table 2. The most important nations that produce barley are Germany, Canada, France and the United States of America. Turkey, as well as Arab countries like Syria, Iraq, Morocco and the average production in Iraq was 0.901 million tons compared with neighboring countries, Turkey (7.31 million tons), Iran (2.65 million tons) and Syria (1.02 million tons(Baaorono, 1988).

Table 2: Area, Production and Productivity of the Barley Crop in Selected Countries of the World for the Period 1980-2011

Country	Area	Production	Productivity
Germany	2.378	12.600	5.299
Canada	4.274	12.036	2.816
France	1.829	10.183	5.568
Spain	3.641	8.616	2.366
USA	2.713	8.092	2.983
Turkey	3.377	7.310	2.164
Australia	3.300	5.507	1.669
Denmark	0.906	4.307	4.753
China	1.176	3.362	2.859
Iran	1.862	2.653	1.425
Morocco	2.225	1.971	0.886
Romania	0.612	1.801	2.941
India	0.993	1.562	1.574
Syria	1.622	1.021	0.629
Iraq	1.243	0.901	0.725
Mexico	0.277	0.603	2.181
Tunisia	0.417	0.351	0.841
Saudi Arabia	0.048	0.281	5.898
Japan	0.082	0.273	3.336
Brazil	0.107	0.198	1.856
Egypt	0.060	0.145	2.401
Pakistan	0.151	0.129	0.850
Libya	0.187	0.090	0.482
Lebanon	0.011	0.019	1.746
Kuwait	0.001	0.001	2.319
World average	67.274	155	2.304
Minimum	0.001	0.001	0.482
Maximum	4.274	12.600	5.898
Standard Dev	1.293	3.988	1.521

Notes: (area million hectares million tons production, productivity t / ha),(Source: FAO STATISTICS - FAO STAT - GROPS 2009)

The cultivation of grains is spread in most parts of Iraq, but the cultivated grains are different from one region to another, depending on the environmental and climatic conditions. The total acreage of grain crops between (1980-2011) was a high rate of (83%) of the total acreage at the country level. Thus, the cultivated area increased in the eighties from 10692.2 thousand acres to 12595.4 thousand acres, through the nineties and then dropped to 10501.3 thousand acres after 2001 as in the table 3.

Table3: Area, production and productivity of cereal crops in Iraq 1980-2011

Duration	Production (1000 of tons)	Productivity (Kg/acres)	Area (1000 (Acres)
1980-1991	**1993**	**187**	**10692.2**
1992-2001	**2568**	**220**	**12595.4**
2002-2011	**3199.6**	**304**	**10501.3**

(Source: Ministry of agriculture in Iraq).

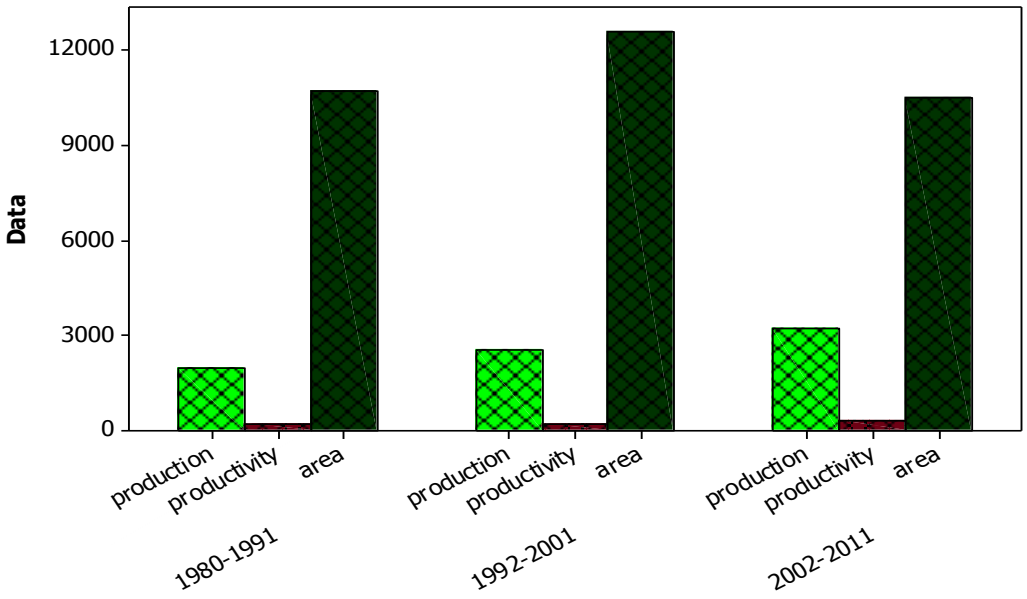

Figure 1:Area, Production and Productivity of Cereal Crops in Iraq during Three Periods.
(Sources: Ministry of agriculture, statistical department.)

The fluctuation in cultivated area was because of several different reasons, including water scarcity or low rainfall or due to lack of good pricing policies or because of political circumstances. The grain production has the average 237 kg /acre. The importance of these crops which made it represents a large area of acreages must be identified with the reality of each crop, which will be mentioned below:

1. The reality of the production of wheat crop in Iraq and in the areas irrigated by rainfall and the areas irrigated by rivers for the period (1980-2011). The wheat serves as one of the main crop, which occupies the top rank in the economy of most countries of the world. In addition, wheatgrows on the surface of the earth in abundance similar to many other types of crops, and can be planted everywhere on the surface of the globe in all tropical and temperate. It is a crop that the Government of Iraq attached great importance to it, as wheat covered 49% of the total cultivated area of grain for the period (1980-2011) in Iraq (Balat & Balat, 2009). The cultivated area was increased from **8327** thousand acres in the eighties to **11688** thousand acres in the nineties and then was decreased to **10572** thousand acres in a period after the year 2000.

Table 4: Area, Production and Of Wheat Crop during Three Periods 1980-2011.

Period	Average production (1000 ton)	Average cultivation area (1000 acres)
1980-1990	**1087**	**8327**
1991-2000	**325**	**11688**
2001-2011	**469**	**10572**

Sources: Ministry of agriculture, statistical department.

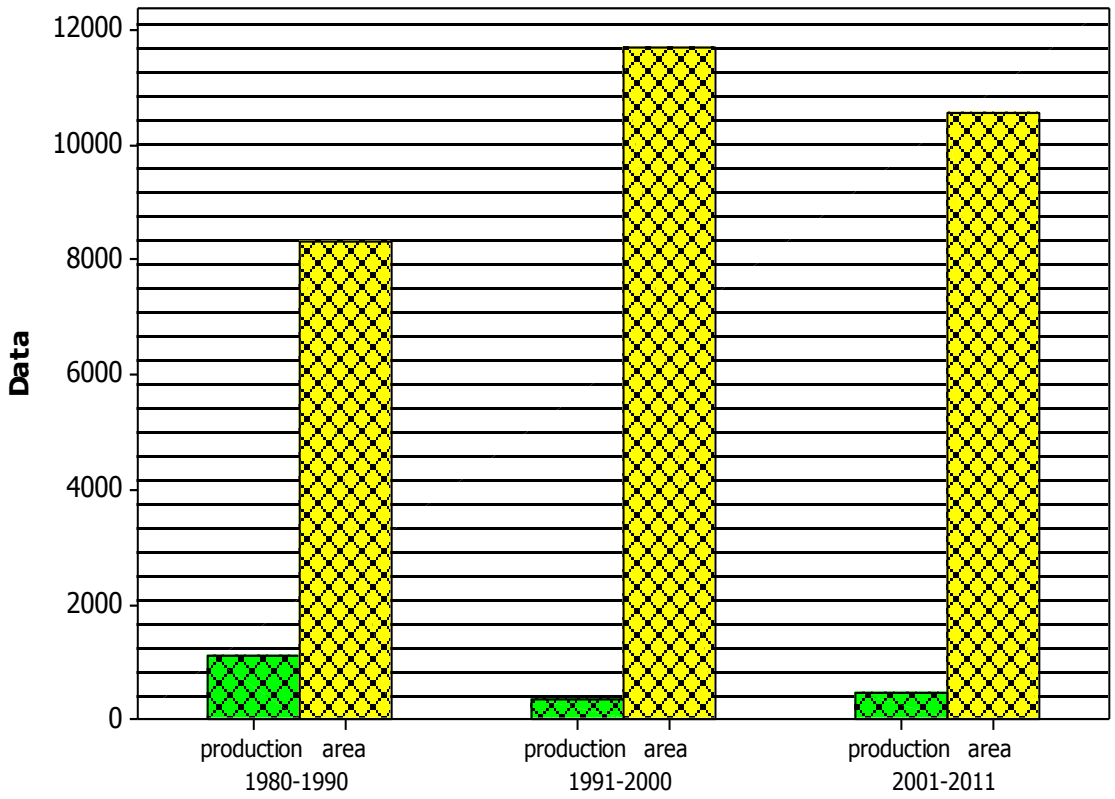

Figure2: Area, Production of Wheat Crop during Three Periods 1980-2011.
Sources: Ministry of agriculture, statistical department.

During the period (1980-2011), the average cultivated area for the wheat crop has been accounted **10149** thousand acres in Iraq. As shown in the table 4 and this is due the absence of a successful agricultural policy based on expanding the production of the crop (Asia, 2003; Khush, 1997). In 1980, because of the lack of labors during the war between Iran and Iraq, the wheat production reduces substantially. It is worth that the lower area planted in 1980, can be attributed to the futility of prices and shift of capital and labor to the commercial and industrial sectors at that time. After 1990, based on observations, this area increased in acreage amounting to the largest area from 1991-2000. As a result of the economic blockade imposed on the country, as well as farmers were attracted by incentive of good prices (Tkachenko, 2003). Nevertheless, at the level of the rain-irrigation, cultivated area for the period of 1980-2011 averaged to 5081 thousand acres of land, with a minimum of 2000 thousand acres in 1980 and maximum (8000) thousand acres in 2011 as in the table5.The cultivation area irrigated by rain is fluctuating as in Figure 3. This fluctuation is due to the practice of agricultural system by rain -fall irrigation method and periods of rain-fed (Oweis, Hachum, & Kijne, 1999).Table 5shows that, the average cultivated area irrigated by river reached 5068 thousand acres of land area. In 1980 the minimum value of cultivation area 1987 thousand and the highest value 7978 thousand acres in 2011 as illustrated in Figure2.The wheat production in the country averaged 328 thousand tons during the study period and reached its lowest level in 1980 as it was 48 thousand tons, and reached its highest level

in 2011 at 818 thousand tons, which constitutes about 17 times as in 1980. And the severe deflation in the 1980 was attributed to the drought that occurred in the region. With regard to the productivity of wheat there is a clear fluctuation in wheat productivity in Iraq, whether at the level of the country in general, or at the level of the region, dependent on rainfall and the river water for irrigation as in Figure 5. The average productivity during the period 1980-2011 was 270 kg /acre with the minimum of 50 kg / acre in 1981 and peak of 410 kg / acre in 2011 table 5.The average productivity level of agriculture that relies on rain fell to 140 kg / acre as in the table 5 and reached its highest level of 208 kg / acre in 2011 but the lowest level in 1981 of 30 kg / acre, and the declining in productivity because of the dry season, which occurred in the area irrigated by rain water. The productivity of irrigated by river water reached in the annual average of about 130 kg / acre for the duration of the study, which ranged from a minimum of 20 kg / acre in 1981 and a high amount 202 kg / acre in 2011 (Asia, 2003).

Table 5: Area, production and productivity of wheat crop at the level of Iraq and the level of rain-irrigated areas and irrigated by river water for the period (1980-2011)

Year	PRODUCTION 1000 ton			PRODUCTIVITY 1000 ton			CULTIVATION 1000 acre		AREA
	Iraq	River	Rain	Iraq	River	Rain	Iraq	River	Rain
1980	48	18	30	96	36	60	3987	1987	2000
1981	62	25	37	50	20	30	9987	4987	5000
1982	116	52	64	85	38	47	10987	5487	5500
1983	194	91	103	139	65	74	11187	5587	5600
1984	206	97	109	138	65	73	11987	5987	6000
1985	212	100	112	133	63	70	12787	6387	6400
1986	234	111	123	335	159	176	5587	2787	2800
1987	240	114	126	334	159	175	5747	2867	2880
1988	246	117	129	329	157	172	5987	2987	3000
1989	254	121	133	304	145	159	6667	3327	3340
1990	286	137	149	342	164	178	6687	3337	3350
1991	286	137	149	337	162	175	6787	3387	3400
1992	294	141	153	337	162	175	6987	3487	3500
1993	300	144	156	339	163	176	7077	3532	3545
1994	316	152	164	355	171	184	7107	3547	3560
1995	322	155	167	184	89	95	13987	6987	7000
1996	324	156	168	180	87	93	14387	7187	7200
1997	328	158	170	178	86	92	14787	7387	7400
1998	344	166	178	189	91	98	14587	7287	7300
1999	364	176	188	192	93	99	15187	7587	7600
2000	368	178	190	184	89	95	15987	7987	8000
2001	368	178	190	347	168	179	8487	4237	4250
2002	374	181	193	333	161	172	8987	4487	4500
2003	388	188	200	338	164	174	9187	4587	4600
2004	420	204	216	354	172	182	9487	4737	4750
2005	426	207	219	356	173	183	9587	4787	4800
2006	428	208	220	350	170	180	9787	4887	4900
2007	448	218	230	365	178	187	9827	4907	4920
2008	458	223	235	367	179	188	9987	4987	5000
2009	472	230	242	315	154	161	11987	5987	6000
2010	564	276	288	347	170	177	12987	6487	6500
2011	818	403	415	410	202	208	15987	7987	8000
Avrg	328.4	158	170.2	270.1	129.9	140.2	10149.2	5068.1	5081.1
Hight	818	403	415	410	202	208	15987	7987	8000
Lowt	48	18	30	50	20	30	3987	1987	

Source: The Ministry of Planning and Development Cooperation - Department of Planning and Follow-up - the Department of Agricultural Statistics• Ministry of Agriculture - Department of Planning and Follow-up - Agricultural Statistical Service and the workforce - unpublished data

Table 6: Area, production and productivity of the barley crop during three periods 1980-2011

Duration	Barley production	Cultivation area for barley
1980-1990	2681	125075
1991-2001	4748	173389
2002-2011	7014	166775

Source: calculated by the researcher based on a table 7

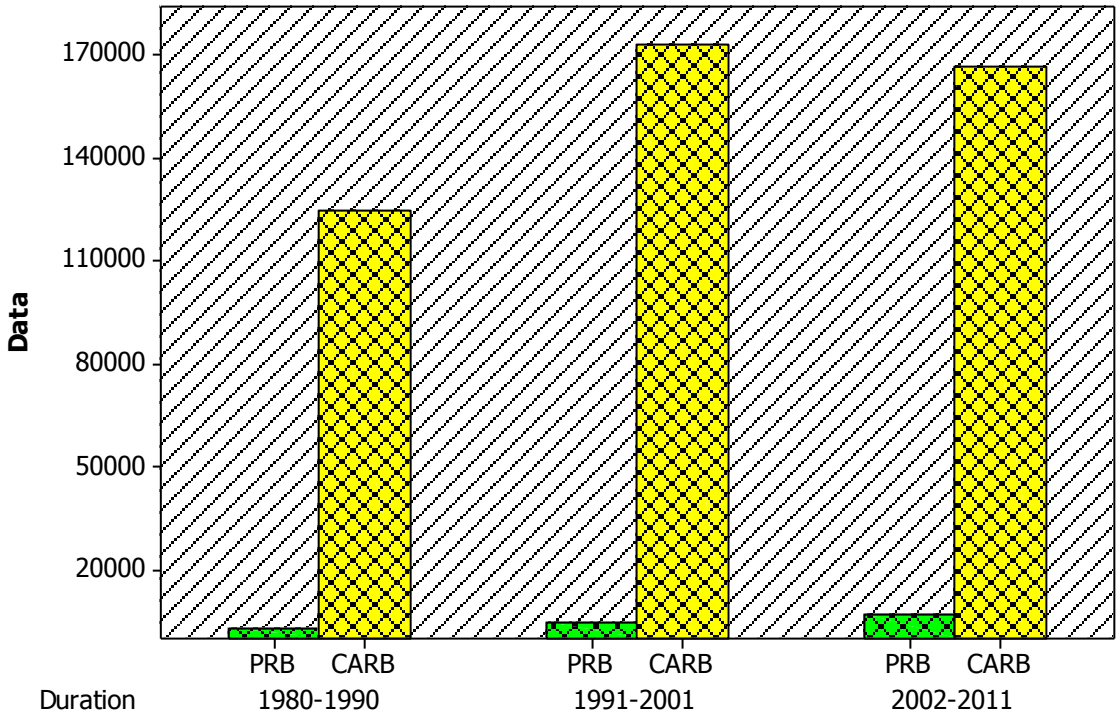

Figure3: Area, production of barley crop during three periods 1980-2011. (Sources: Ministry of agriculture, statistical department).

The cultivated area increased from 125074 thousand acres in the eighties to 175127 thousand acres in the nineties, and then decreased to 166775 thousand acres during the period 2000-2011.Total area irrigated by rain -fed in an average was about 128928 thousand acres for the duration of the study. See table7.Therefore, the minimum cultivation area was at 49677 thousand acres in 1980, and recorded in 2011 the highest area amounted to about 199678 thousand acres. The cultivated area irrigated by river water was averaging about 25785 thousand acres, with a minimum of 9935 thousand acres in 1980 (Zhang, Wang, Sun, Chen, & Shao, 2013), and had reached the highest level of 39935 thousand acres in 2011**.** The production of barley in Iraq ranged between 540 thousand tons in 1980 and 12090 thousand tons in 2011. The average annual production was 4746 thousand tons seeing the table 7 which was about 31 percent (31%) of the total cereal production in Iraq during the study period. The production in rain-fed areas, has the average annual production of 3954 thousand tons in 1980, and about 10075 thousand tons in 2011 with the minimum of 450 thousand tons. Barley production on irrigated by river averaged 790 thousand tons during the study period (Al-Obaidy, 2012), ranged from a minimum of (90) thousand tons in 1980, and the highest total of 2015 thousand tons in 2011.With regard to productivity has average annual productivity of barley 254 kg / acre during the period (1980-2011) at the country level. It ranged from the highest total 404 kg / acre in 2011, the lowest total 40 kg / acre in 1981. It can be clearly seen that the shows the fluctuation of productivity at the country level, and also of the regions irrigated by rainwater and areas irrigated by rivers. The average annual production of barley at the level of the area that irrigated by rain-fed 129 kg / acre, and its reached peak level in 2011 as it was (203) kg / acre and reached its lowest level in 1981 reached of 23 kg / acre. At the level of region irrigated by river water has the average productivity of 127 kg / acre and ranged from the highest 202 kg / acre in 2011, and a minimum of 20 kg / acre in 1981.

Table 7: Area, Production and Productivity Of The Barley Crop that Irrigated And Rain-Feed Area For The Period 1980-2011

Year	Production 1000 tons			Productivity Kg/acre			Cultivation area 1000/acre		
	Iraq	River	Rain	Iraq	River	Rain	Iraq	River	Rain
1980	540	90	450	72	36	39	59612	9935	49677
1981	750	125	625	40	20	23	149612	24935	124677
1982	1560	260	1300	76	38	39	164612	27435	137177
1983	2730	455	2275	130	65	68	167613	27935	139678
1984	2910	485	2425	130	65	66	179613	29935	149678
1985	3000	500	2500	126	63	64	191611	31935	159676
1986	3330	555	2775	318	159	163	83612	13935	69677
1987	3420	570	2850	304	152	156	90001	15000	75001
1988	3510	585	2925	314	157	158	89611	14935	74676
1989	3630	605	3025	290	145	147	99812	16635	83177
1990	4110	685	3425	328	164	168	100112	16685	83427
1991	4110	685	3425	324	162	164	101612	16935	84677
1992	4230	705	3525	324	162	166	104613	17435	87178
1993	4320	720	3600	326	163	164	105961	17660	88301
1994	4560	760	3800	342	171	173	106413	17735	88678
1995	4650	775	3875	178	89	93	209613	34935	174678
1996	4680	780	3900	174	87	91	215612	35935	179677
1997	4740	790	3950	172	86	90	221612	36935	184677
1998	4980	830	4150	182	91	95	218613	36435	182178
1999	5280	880	4400	186	93	96	227611	37935	189676
2000	5340	890	4450	178	89	93	239611	39935	199676
2001	5340	890	4450	274	137	139	156003	26000	130003
2002	5430	905	4525	302	151	155	144002	24000	120002
2003	5640	940	4700	308	154	156	146403	24400	122003
2004	6120	1020	5100	334	167	169	147002	24500	122502
2005	6210	1035	5175	332	166	167	150003	25000	125003
2006	6240	1040	5200	330	165	167	151503	25250	126253
2007	6540	1090	5450	342	171	173	153001	25500	127501
2008	6690	1115	5575	330	165	169	162001	27000	135001
2009	6900	1150	5750	308	154	157	179611	29935	149676
2010	8280	1380	6900	340	170	171	194613	32435	162178
2011	12090	2015	10075	404	202	203	239613	39935	199678
Average	4383	731	3652.5	246	123	126	150554	25092	125462
Highest	12090	2015	10075	404	202	203	239613	39935	199678
Lowest	540	90	450	40	20	23	59612	9935	49677

Source: The Ministry of Planning and Development Cooperation – Department of Planning and Follow-up - the Department of Agricultural Statistics • Ministry of Agriculture - Department of Planning and Follow-up - Agricultural Statistical Service and the workforce - unpublished data

1.3 Price policy

The price policy is a set of principles foundations and the actions taken, relating to prices of agricultural products and agricultural inputs which are designed to promote agricultural productivity, and make structural changes desirable; as well as to protect producers and consumers, within the general framework of good pricing policy and the economic development plan for an economy (Berbel & Gómez-Limón, 2000).There are several views of economists about drawing agricultural policy in terms of priority and precedence with economic policies in other sectors. And the view was probably that, agriculture tends to be considered as an essential part of economic activities. (Nganje, Bangsund, Leistritz, Wilson, & Tiapo, 2004).The policy dealing with main activities such as agricultural production, marketing activity and loans, as well as price policy, could play an important role in achieving significant growth in agricultural production if it has been organized, and implemented in a proper and efficient manner.The price policy can be considered one of the important economic actions in directing agricultural production towards the desired level, and in guiding consumption and the distribution of income among members of society. Therefore, the price system must be determined with high incentive to stimulate the agricultural production, and to improve production quality as well as quantity. And takes to achieve those goals of contradictions between the desire to achieve better prices of the product for producers, and a low price suitable for the consumers (Dawson, Sanjuán, & White, 2006; von Cramon-Taubadel, 1992). Various studies on the supply response functions for various agricultural crops in or outside Iraq, have shown the impact of prices and response of agricultural producers and to varying degrees among different crops and agricultural products, depending on the nature of the area and environmental circumstances and institutions involved (von Cramon-Taubadel, 1992).

1.4 Statement of the problem

Because the increasing of population and the multiplicity and diversity of industries that depend on food crops such as wheat, barley as raw materials, and also one of the main sources of food for human beings as well as to constitute the second major source of the animal feed, demand for these crops increased. The demand was increased, however, then accompanied by a shortage of domestic production of both crops, low production and productivity as a result of the fluctuating of the cultivated areas, as well as the lack of rain and dry rivers that must be available to irrigate crops and the role of price policy in achieving the crop production to the optimal level. Based on the foregoing, the prices of wheat and barley become increase. Therefore, it becomes a matter of importance to estimate the wheat and barley crops response to price changes and non-price factors; by using scientific methods to ensure access to the most reliable estimates, thus, become an important issue. Wheat crop is the most important cereal crops in the production as well as consumption side, but the majority of the wheat consumed in Iraq is sourced outside the country, and people obtained the wheat through the ration card system. Moreover, the domestic production of wheat constitutes a third of the supply of this crop.

Moreover, it was observed that, in the rainfall cultivated area the amount of production and productivity of wheat and barley crops declines substantially because of the scarcity of rainfall during some seasons, which affect the level of germination during the season that made germination weak and the crops may not rise to the level of maturity which led to degradation in all the rainfall cultivated areas that produce wheat and barley, respectively. Due to the decline in production and productivity of wheat and barley, there is weakness of production in the rain water cultivated areas. The main reason for the irregular production quantities is the fluctuation of rainfall from year to year, especially in the last decade, which requires a suitable agricultural policy and considerations to other factors affecting agricultural production in Iraq. According to this issue the crop production in Iraq suffers from fluctuation production, therefore the production cannot cover the needs of the people. Therefore Iraq imports two-thirds of its wheat needs to cover domestic consumption. The cultivable area in Iraq is about 8 million hectares and these represents less than 15% of the total land area of Iraq. These crops are grown on 4 to 5 million hectares. The concentration of most of the arable lands of Iraq is in the north and northeast of Iraq; where winter crops such as wheat, barley mainly grown in the valleys of the Tigris and Euphrates rivers. Total production of cereals (winter crops: wheat and barley) represent 70% to 85% of the total cultivated area. The agricultural crop production activities in Iraq are concentrated in two different regions of the country. Rainfall dominated areas of the north of Iraq and the irrigated areas in the center and south of. The agricultural production generally carried on small cultivable lands, although the rain-fed farms in the North tend to be larger at a rate of 10-30 hectares and of irrigated farms in the center and south of Iraq at a rate of 1 - 2.5 hectares. The crops in the rain fed land are usually poor and vary considerably for differences in rainfall. Wheat crop is one of the most important crops of Iraq in terms of both volume and value over the period of the past two decades. The rate of import of wheat was about 2.6 million tons per annum. The annual cost for the importation of grains (wheat) was $ 750 million. The Main countries that Iraq import wheat from being Australia, USA and Canada. As for barley, there is also a large gap between domestic consumption and domestic production because barley is consumed as food for humans and animal feed. As a result of the increasing number of projects in animal husbandry and the increase in demand for the consumption of barley feed, the Iraq Government imports to cover these needs. The total production in the irrigated area by river and by rain water is 30,286 tons (40%) and 39,000 tons (60%), respectively, of the overall total production of barley in Iraq which was put at 78336 thousand tons. Despite that Iraq needs to import barley from other countries to cover its needs. The table can explain what is Iraq needs to cover the consumption from the wheat crop by importing it from others country.

Table: 8 the production, consumption, food gap, Self-sufficiency ratio and Ratio dependence on imports for wheat crop in Iraq.

Year	Production 1000 tons	Consumption 1000 tons	Food Gap	Self-sufficiency ratio, %	Ratio, % dependence on imports
2002	193	2002	193	2002	193
2003	200	2003	200	2003	200
2004	216	2004	216	2004	216
2005	219	2005	219	2005	219
2006	220	2006	220	2006	220
2007	230	2007	230	2007	230
2008	235	2008	235	2008	235
2009	242	2009	242	2009	242
2010	288	2010	288	2010	288
2011	415	2011	415	2011	415

(Sources: ministry of agriculture in Iraq, statistical department).

This study aimed to help the Iraqi farmers to increase their production from wheat and barley via understanding the factors that can affect positively on the production of wheat and barley in the short run and in the long run.

1.5Research Objective

In this study, we have general objective and specific objectives respectively as follows.

General Objective

The general objective of this study is to identify factors influencing the supply response of farmers producing both wheat and barley crops

Specific Objective

1-To examine the impact of the price factor and non price factors on supply of wheat in Iraq

2-To examine the impact of the price factor and non-price factors on the supply of barley in Iraq

3-To examine the short run and long run price influence on the supply of wheat and barley in Iraq.

1.6 Research Hypothesis

H1: the impact of price and non price factors positively affect the supply of wheat in Iraq.

H1: the impact of the price factor and non price factors positively affect the supply of barley crop in Iraq.

H1: the short run and long run prices influence positively on supply of wheat production in Iraq.

H1: the short run and long run prices influence positively on the supply of barley production in Iraq.

1.7 Research question

1. What is the pattern of supply of wheat and barley crop in Iraq level?
2. Which variable can determine the wheat and barley production, whether these variables from the price factors or non price factors?
3. What is the extent of relation each of non pricefactors like (cultivation area, irrigation from the river, irrigation by rainfall) and the price factor like (own price of the crop) on the crop production?
4. -Does the cultivation area have an effect on crop production?
5. - Does the irrigation by the river have an effect on crop production?
6. -Does the irrigation by rainfall have an effect on crop production?
7. Does that run elasticity in the short run and long run for own price for the wheat and barley crop has an effect on production?

1.8 Significance of the study

Wheat crop occupies is the first rank among cereal crops in the world (Somers, Isaac, & Edwards, 2004; Taylor & Foy, 1985), and Iraq. Barley, Hordeumvulgare L., Comes after wheat among grain crops in Iraq, in terms of area and production volume, and the advantage over wheat crop was that it can withstand drought and salinity. Both wheat and barley are very important crops in Iraq because they are considered as the first main source of food for human being and constitute the second major source of the animal feed. Thus, more than 30% of the farmers in Iraq are dependent on the wheat and barley crops for survival. We can consider wheat and barley are also the main source of cash income for many farmers as well as for many companies and factories in the country. The crops also have an important impact on food security, which is a precondition for achieving national security and of self-sufficiency (Farouk-Sluglett & Sluglett, 1983; Field, 1993). Despite the importance that these crops, wheat and barley occupied, alas,

the proportion of self-sufficiency in Iraq is very low. However, great changes can be observed in the production of crops due to the impact of price and non-price factors which may affect the supply response of producers. Thus, based on the research considerations, the areas are fragmented based on the geographical location. That area produced depends on the rate of rainfall, and depends on the irrigation by the river.

1.9 Scope and Limitation of the study

There were some limitations in this study. The fluctuation in cultivated area caused the reducing in the production of wheat and barley and this is the main issue in this study. And there are many variables can impact on the production of wheat and barley. Inthe other word cultivation area, irrigation by the river, irrigation by rain and the own price of crop can affect on the production of crops. In this study the assumption that all variables above can affect positively on the production of wheat and barley crop. First of all, the current study utilized a correlation research design for investigating the relationship between crop production, cultivation area, irrigated by the river, irrigation by rainfall, own price of the crop and the crop production thus, one of the main limitation to create from the selected research design. Based on the nature of the study, an experimental design was not feasible because independent variable not be manipulated. Therefore, because of lack of manipulation of the independent variable directives, the causal relationship could be obtained from correlation analysis (Wilson & Lipsey, 2001).

1.10 Chapter Summary

According to chapter 1, introduction, statement of the problem, research objective, research question, scope, limitation, and chapter summary have been presented.

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