Lecture Note #17: Pivot Tables Part #3

BUSI 201: Business Data Analysis

Fall 2023

Topic 1. PivotTables: Grouping

When we have a wide range of variables taking up the row or columns, we may gain more insight about the data when we gather them into larger groups. For instance, you may want to analyze individuals by groups of age, daily sales data in terms of weeks, etc. Navigate to worksheet PIVOT-DATE in the workbook BUSI201-LEC17-Workbook.xlsx. Replicate the table below using PivotTables:

		1/1/2023	1/2/2023	1/3/2023	1/4/2023	1/5/2023	1/6/2023
Branch 1	Item 1						
	Item 2						
	Item 3						
Branch 2	Item 1						
	Item 2						
	Item 3						

Filling each empty cell with the number of each items sold in each office by date, we get the table in Figure 1. The problem with this table is that it is quite "wide," where the total number of columns add up to 34. So, we may want to aggregate sales data by week to reduce the number of columns in our table to have the table fit in one reasonable page.

н	<u> </u>	J	К	L	М	N	0	P	Q	R	S	т	U	V	W	Х	Y	Z	AA	AB	PivotTable Fields	5 V
Sum of Quanti	ity	Date 💌																			Choose fields to add to repo	int:
Branch	💌 Item 💌	1/1/2023	1/2/2023	1/3/2023	1/4/2023	1/5/2023	1/6/2023	1/7/2023	1/8/2023	1/9/2023	1/10/2023	1/11/2023	1/12/2023	1/13/2023	1/14/2023	1/15/2023 1	1/16/2023	1/17/2023	1/18/2023 1	/19/2023		
Atlanta	IPad	366	500	151	375	133	271	125	208	265	200	410	158	82	215	448	335	195	135	277	Search	
	IPhone	339	212	33	77	18	269	173	474	417	325	460	463	445	320	111	483	322	29	258	Date	
	MacBook	191	219	330	226	58	486	469	146	323	127	388	350	324	495	227	37	168	279	192	Branch	
Atlanta Total		896	931	514	678	209	1026	767	828	1005	652	1258	971	851	1030	786	855	685	443	727	🗹 İtem	
Boston	iPad	35	76	238	145	412	236	182	115	79	125	258	261	166	238	30	430	448	136	489	Quantity	
	iPhone	172	361	182	269	69	404	145	480	137	349	155	423	295	342	44	368	50	23	309	Sales	
	MacBook	59	433	153	457	55	335	349	327	486	36	266	77	424	372	327	40	278	109	478	MOTE TADIES	
Boston Total		266	870	573	871	536	975	676	922	702	510	679	761	885	952	401	838	776	268	1276		
Chicago	IPad	19	52	191	40	368	431	257	221	179	477	272	459	337	177	119	329	448	193	396		
	iPhone	164	44	262	114	54	305	73	464	192	167	339	243	298	244	282	44	438	258	397		
	MacBook	254	80	96	427	114	250	141	206	18	442	92	10	435	404	364	331	156	61	165		
Chicago Total		437	176	549	581	536	986	471	891	389	1086	703	712	1070	825	765	704	1042	512	958		
Denver	iPad	500	71	150	351	481	417	91	227	274	377	142	73	450	266	104	298	258	282	165	Dran fields between areas b	elow
	iPhone	151	374	309	302	392	162	342	497	483	344	142	132	202	386	21	161	46	84	405	-	
	MacBook	362	55	96	393	308	299	130	123	209	177	27	215	123	363	445	478	295	66	225	T Filters	II Columns
Denver Total		1013	500	555	1046	1181	878	563	847	966	898	311	420	775	1015	570	937	599	432	795		Date
Grand Total		2612	2477	2191	3176	2462	3865	2477	3488	3062	3146	2951	2864	3581	3822	2522	3334	3102	1655	3756		
																					-	-
																					- Kows	2. Values
																					Branch ~	Sum of Quantity
																						-

Figure 1: PIVOT-DATE

Grouping by Date

To group dates into weeks, first click on any of the dates in the Pivot Table, right click, and then select **Group**. In the **Grouping** window that pops up, select **Days**, and then change the **Number** of **days** to 7 to group days into weeks.



Figure 2: Grouping by Dates

The PivotTable with dates group into 7 days each shows up in Figure 3. You may want to change the number of days so that each column represents a similar number of days, or adjust the beginning and end dates before grouping the variables so that the table is "regular."

A	В	C	D	E	F	G H	1	J	к	L	м	N	0	BivotTable Field	
2	Date	Branch	Item	Quantity	Sales	Sum of Quan	tity	Davs (Date)						FIVOLIADIE FIEIU:	
3	1/1/2023	Atlanta	iPhone	339	\$ 33,927.63	Branch	Titem T	1/1/2023 - 1/7/2023	1/8/2023 - 1/14/2023	1/15/2023 - 1/21/2023	1/22/2023 - 1/28/2023	1/29/2023 - 2/1/2023	Grand Total	Choose fields to add to repo	n:
4	1/2/2023	Atlanta	iPhone	212	\$ 21,012.76	Atlanta	iPad	1921	1538	1512	2108	54	7619	Search	Q
5	1/3/2023	Atlanta	iPhone	33	\$ 3,283.65		iPhone	1121	2904	1541	1537	55	5 7659	Date	
6	1/4/2023	Atlanta	iPhone	77	\$ 7,661.45		MacBook	1979	2153	1508	2217	52	8380	Branch	
7	1/5/2023	Atlanta	iPhone	18	\$ 1,798.11	Atlanta Total		5021	6595	4561	5862	161	23658	✓ Item	
8	1/6/2023	Atlanta	IPhone	269	\$ 27,324.31	Boston	iPad	1324	1242	1723	1924	94	3 7161	Quantity	
9	1/7/2023	Atlanta	iPhone	173	\$ 17,040.71		IPhone	1602	2181	1548	2334	90	7 8572	Sales	
10	1/8/2023	Atlanta	iPhone	474	\$ 47,760.08		MacBook	1841	1988	1831	1605	34	5 7611	More Tables	
11	1/9/2023	Atlanta	iPhone	417	\$ 41,084.83	Boston Total		4767	5411	5102	5863	220:	23344		
12	1/10/2023	Atlanta	iPhone	325	\$ 31,854.59	🗏 Chicago	iPad	1358	2122	2101	1757	44	3 7786		
13	1/11/2023	Atlanta	iPhone	460	\$ 45,978.11		iPhone	1016	1947	1673	1158	78	7 6581		
14	1/12/2023	Atlanta	iPhone	463	\$ 45,872.35		MacBook	1362	1607	1541	1525	97	7005		
15	1/13/2023	Atlanta	iPhone	445	\$ 45,181.02	Chicago Tota	1	3736	5676	5315	4440	220	5 21372		
16	1/14/2023	Atlanta	IPhone	320	\$ 31,720.66	Denver	iPad	2061	1809	1909	2104	80	8 8691	Drag fields between areas b	elow:
17	1/15/2023	Atlanta	iPhone	111	\$ 11,151.07		IPhone	2032	2186	1205	2037	50	3 7968	W Filmer	III. Column
18	1/16/2023	Atlanta	iPhone	483	\$ 48,110.72		MacBook	1643	1237	1702	2435	60	3 7620	1 Filters	Dave (Date)
19	1/17/2023	Atlanta	iPhone	322	\$ 32,083.36	Denver Total		5736	5232	4816	6576	191	24279		Days (Date)
20	1/18/2023	Atlanta	iPhone	29	\$ 2,907.11	Grand Total		19260	22914	19794	22741	794	92653		
21	1/19/2023	Atlanta	iPhone	258	\$ 25,544.63										
22	1/20/2023	Atlanta	iPhone	224	\$ 22,017.98										
23	1/21/2023	Atlanta	iPhone	114	\$ 11,454.77									E Rows	Σ Values
24	1/22/2023	Atlanta	IPhone	335	\$ 33,411.87									Branch ~	Sum of Quantity ~
25	1/23/2023	Atlanta	iPhone	197	\$ 19,737.74									ltem ~	
26	1/24/2023	Atlanta	iPhone	39	\$ 3,901.21										
27	1/25/2023	Atlanta	iPhone	149	\$ 14,831.43										
28	1/26/2023	Atlanta	iPhone	396	\$ 39,569.81										

Figure 3: Grouped by Dates

Grouping by Numbers

We can also group the variables as long as it is numerical. Navigate to worksheet PIVOT-YEARS, which houses real world data on government expenditure as a proportion of GDP. One of the variables is Year, but note that it is not automatically recognized as dates. Generate a PivotTable with years being the row variables, Country being the column variables, and each value entry to be the average of G/GDP.

	АВ	С	D	E <u>F</u> GHIJKLMNOPQRSTU	A	
1					Pivotia	able Fields V X
2	Country	Year	G/GDP	Average of G/G0 B I = 0 × A × H × 40.5% of Grouping ? ×	Choose field	ds to add to report: 💮 👻
3	United States	1990	21.56%	Year Auto	Cauch	
4	United States	1991	22.88%	19 Search the menus 0.2155893 0.20888304 2 garting at: 1990	Search	
5	United States	1992	21.82%	19 Db. Conv. 0.20284386 0.207049343 E Ending at: 2020	Countr	y
6	United States	1993	21.42%	19 U 2007 0.21818384 0.2026681 Br: 10	🗹 Year	
7	United States	1994	20.73%	19 Dormat Cells 0.191687837	G/GDP	
8	United States	1995	20.53%	19 2 Befresh 0.20731455 0.184894193 OK Cancel	More Table	s
9	United States	1996	20.01%	19 Sort > 0.20533005 0.186506843		
10	United States	1997	19.39%	19 Filter > 0.20005396 0.180360563	•	
11	United States	1998	18.72%	19 Subtotal "Year" 0.19389675 0.173262217		
12	United States	1999	18.10%	19 0.1668574		
13	United States	2000	17.93%	L18104439 0.16607798		
14	United States	2001	19.51%	20 ^{- 收} 日 <u>\$croup</u> p.17926537 0.164603717		
15	United States	2002	20.08%	20 ⁴ 日 Wngroup p.19509764 0.19110384		
16	United States	2003	20.66%	20 Move > 0.2008401 0.190235465	Drag fields	between areas below:
17	United States	2004	20.45%	20 × Remove "Year" 0.20660633 0.193489835	-	1
18	United States	2005	20.75%	20 E Field Settings. 0.20448536 0.188572265	T hiters	III Columns
19	United States	2006	20.60%	20 Distribution 0.12745104 0.13284546		Country *
20	United States	2007	20.86%	20 10 10 10 10 10 10 10 10 10 10 10 10 10		
21	United States	2008	22.79%	Ligi Pilo Pilog Lint 2007 U. 1990279 0.20864645 0.189137125		
22	United States	2009	25.58%	2008 0.17083353 0.22104532 0.22787626 0.206585037		
23	United States	2010	26.05%	2009 0.18854172 0.21570011 0.2557652 0.220002343	= Peur	∑ Values
24	United States	2011	25.35%	2010 0.19084707 0.21403655 0.26054605 0.221809893	Vear	Average of G/GDP Y
25	United States	2012	23.91%	2011 0.17850267 0.21732147 0.25345705 0.216427063	1601	
26	United States	2013	22.94%	2012 0.17517519 0.21873823 0.23911901 0.21101081		
27	United States	2014	22.70%	2013 0.17084883 0.21551323 0.22938948 0.205250513		
28	United States	2015	22.50%	2014 0.1640205 0.21781788 0.22695072 0.2029297		

Figure 4: Grouping by Numbers

Right click any year in the PivotTable, and select Group. A slightly different grouping window will pop up in the blue box, as Excel does not recognize the years as a date variable. Figure 5 shows us what the PivotTable should look like when we group the data by 5 years.

	A B	С	D	E F	G	Н	1	J
2	Country	Year	G/GDP	Average of G/GDP	Country 🖃			
3	United States	1990	21.56%	Year	Canada	Mexico	United States	Grand Total
4	United States	1991	22.88%	1990-1994	0.248610772	0.13167748	0.216821256	0.199036503
5	United States	1992	21.82%	1995-1999	0.212450344	0.11788097	0.193507688	0.174613001
6	United States	1993	21.42%	2000-2004	0.181503714	0.12680059	0.19725896	0.183692178
7	United States	1994	20.73%	2005-2009	0.175503966	0.218372715	0.22113806	0.201662963
8	United States	1995	20.53%	2010-2014	0.175878852	0.216685474	0.241892462	0.211485596
9	United States	1996	20.01%	2015-2020	0.19477258	0.210112317	0.241033137	0.215306011
10	United States	1997	19.39%	Grand Total	0.198012055	0.173143314	0.219331966	0.198757026
11	United States	1998	18.72%					
12	United States	1999	18.10%					
13	United States	2000	17.93%					
14	United States	2001	19.51%					
15	United States	2002	20.08%					
16	United States	2003	20.66%					
17	United States	2004	20.45%					
18	United States	2005	20.75%					
19	United States	2006	20.60%					
20	United States	2007	20.86%					
21	United States	2008	22.79%					
22	United States	2009	25.58%					
23	United States	2010	26.05%					
24	United States	2011	25.35%					
25	United States	2012	23.91%					
26	United States	2013	22.94%					
27	United States	2014	22.70%					
28	United States	2015	22.50%					

Figure 5: Grouped by Numbers

Topic 2. PivotTables: Filters

Up to this point, we have been primarily interested in three "boxes" when we were creating Pivot-Tables; the Rows, Columns, and Values. However, the remaining fourth box, Filters, can also be quite useful. Adding a filter variable will create a filter above the PivotTable which we can use to filter the data. Let us try out this feature to understand what this filter does for us. Navigate to PIVOT-FILTERS for a hypothetical gradebook.

B	C	D	E	F	G	н	1.1	1	K	L M	N	•	P	Q R	A		
										Extra	(All) 👻				Piv	otTable Fields	
Student ID	Major	Class	Student	Attendance	Quiz	Midterm	Final	Extra	Total	I					Chor	se fields to add to report	
5001	ACCT	so	Alice Johnson	90	85	84	88	1	77.7	Average of Tota	I Column Labels 💌						
S002	ECON	so	Bob Smith	95	92	80	91	1	88.3	Row Labels	FR	50	Grand Total		Sear	ch	
S003	ECON	FR	Charlie Brown	88	95	82	92	0	80.2	ACCT	83.28333333	82.66666667	83.07777778		. In 7	itudent ID	
S004	BUSI	FR	David Davis	92	88	95	99	1	94.9	BUSI	81.55	85.875	83.28		🗹 (Major	
S005	ECON	FR	Eve Wilson	89	48	86	92	1	81.1	ECON	91.1	83.5125	85.58181818			llass	
S006	ACCT	FR	Frank White	91	78	80	87	1	83.5	Grand Total	84.15333333	83.97333333	84.06333333			itudent	
S007	ACCT	so	Grace Miller	94	96	89	94	0	92.9							uttendance Duiz	
S008	ACCT	FR	Hannah Martinez	93	85	87	90	1	88.4						E D	Midterm	
S009	ACCT	FR	lan Anderson	87	62	84	78	1	77.5							final	
S010	BUSI	FR	Jack Wilson	90	89	86	91	1	89						2 F	ixtra	
5011	ECON	so	Katie Taylor	92	87	78	85	1	84						■ 1	otal	
5012	ECON	so	Llam Harris	67	70	54	80	1	68.9						Mon	2 Tables	
5013	ACCT	so	Mia Turner	88	75	80	79	0	79.4								
S014	BUSI	so	Noah Clark	89	93	87	91	1	90						Dray	fields between areas bel	Dier
S015	ECON	FR	Olivia Scott	94	88	85	92	1	89.3								
S016	ECON	FR	Peter Lee	92	91	88	90	1	89.8							liters	III Columns
S017	ACCT	FR	Quinn Young	91	94	91	93	1	91.2						EX	n v	Class
S018	ACCT	FR	Rachel Adams	87	85	82	86	0	84.7								
S019	ACCT	FR	Samuel King	89	92	89	94	1	91.6								
S020	ECON	so	Taylor Green	93	87	86	90	1	88.5								
S021	ECON	FR	Uma Patel	88	78	80	85	0	82.4							P	T. Values
S022	ACCT	FR	Victor Brown	75	69	48	62	1	60.5							ior x	Average of Total
5023	ACCT	so	Wendy Lewis	92	90	88	93	1	90.8						- Ma	100 -	Analoge of Total
5024	ACCT	SO	Xavier Taylor	90	85	82	89	1	86.2								
\$025	ECON	FR	Yara Lopez	94	94	87	95	1	92.3								
S026	ECON	FR	Zane Wilson	62	88	89	92	1	86.8								

Figure 6: Pivot Table Filters

This new filter in the red box allows us to filter the raw data so that only certain portions of the data is visible on the PivotTable. In this specific example, the filter is based on whether a student has extra credit or not.

If we select the value 0 in the filter shown in the <u>blue box</u> in Figure 7, the PivotTable will be show results based on only on the students without extra credit. If we select 1 in the filter, then the PivotTable will be calculated based on only the students who have extra credit.

A	В	с	D	E	F	G	н	1	J.	к	L M	N	O P Q R	A	
1											Extra	(All)	×	Pivot lable Fields	~ ×
2	Student ID	Major	Class	Student	Attendance	Quiz	Midterm	Final	Extra	Total	Search			Choose fields to add to report:	:
3	S001	ACCT	SO	Alice Johnson	90	85	84	88	1	77.7	(All)				
4	S002	ECON	SO	Bob Smith	95	92	80	91	1	88.3	E ₁		SO Grand Total	Search	بر
5	\$003	ECON	FR	Charlie Brown	88	95	82	92	0	80.2			82.66666667 83.0777778	Student ID	
6	\$004	BUSI	FR	David Davis	92	88	95	99	1	94.9			85.875 83.28	Major	
7	S005	ECON	FR	Eve Wilson	89	48	86	92	1	81.1			83.5125 85.58181818	Class	
8	S006	ACCT	FR	Frank White	91	78	80	87	1	83.5			83.97333333 84.06333333	Student	
9	S007	ACCT	SO	Grace Miller	94	96	89	94	0	92.9				Attendance	
10	S008	ACCT	FR	Hannah Martinez	93	85	87	90	1	88.4	Select Multiple Item	5		Midterm	
11	S009	ACCT	FR	lan Anderson	87	62	84	78	1	77.5		OK Cancel		Einal	
12	\$010	BUSI	FR	Jack Wilson	90	89	86	91	1	89				Extra	
13	S011	ECON	SO	Katie Taylor	92	87	78	85	1	84				Total	
14	S012	ECON	SO	Liam Harris	67	70	54	80	1	68.9				More Tables	
15	S013	ACCT	SO	Mia Turner	88	75	80	79	0	79.4					
16	S014	BUSI	so	Noah Clark	89	93	87	91	1	90				Des Cald hat see and had	
17	\$015	ECON	FR	Olivia Scott	94	88	85	92	1	89.3				Drag fields between areas beit	iow:
10	\$016	ECON	FR	Peter Lee	92	91	88	90	1	89.8				T Filters	II Columns
10	5017	ACCT	FR	Ouinn Young	91	94	91	93	1	91.2				Extra ~	Class ~
20	5018	ACCT	FR	Rachel Adams	87	85	82	86	0	84.7					
21	\$019	ACCT	FR	Samuel King	89	92	89	94	1	91.6					
22	\$020	FCON	so	Taylor Green	93	87	86	90	1	88.5					
22	5021	FCON	FR	Uma Patel	88	78	80	85		82.4					
20	5022	ACCT	FR	Victor Brown	75	69	48	62	1	60.5				Rows	Σ Values
24	5022	ACCT	50	Wandy Lewis	92	90	90			90.9				Major	Average of Total ~
20	5025	ACCT	50	Yavier Taylor	90	95	00 07	90	1	96.2				U	
20	5024	FCON	50	Vera Lenna			02	05		03.2					
28	5026	ECON	FR	Zane Wilson	62	88	89	92	1	86.8					

Figure 7: PivotTable Filtering

Other Filters on Pivot Tables

You may have also noticed that there are some filters that appear on the PivotTables by default. These can be seen in the red boxes in Figure 8. These filters can be used to remove certain variables, or sort the order of the variables on the PivotTable itself.

	J	K	L	М	N	0	Р	Q	R	î	PivotTable Fields	~ ×
1				Extra	(All)						Choose fields to add to report:	@ ~
2	Extra	Total								[Search	٩
3	1	77.7		Average of Total	Column Labels 🗖	1					Student ID Major Class	
4	1	88.3		Row Labels	FR	so	Grand Total				Student Attendance	
5	0	80.2		ACCT	83.28333333	82.66666667	83.07777778				Quiz Midterm Final	
6	1	94.9		BUSI	81.55	85.875	83.28				 Extra Total 	
7	1	81.1		ECON	91.1	83.5125	85.58181818				More Tables	
8	1	83.5		Grand Total	84.15333333	83.97333333	84.06333333				Drag fields between areas belo	w:
9	0	92.9									T hiters Extra *	Class ~
10	1	88.4										
11	1	77.5									= Rows	Σ. Values
12	1	89									Major v	Average of Total
13	1	84										
11	1	68.9										

Figure 8: Other Filters in Pivot Tables

Topic 3. PivotTables: Calculated Fields

Sometimes, we may be interested in variables that are not already included in the source data. We can either edit the original data, but this editing the raw data manually is usually not considered "best practice," as there is an associated risk of contamination. Instead, if the data is easily calculated from the existing variables, we can use Calculated Fields to add a variable in the PivotTable.

Navigate to worksheet PIVOT-CREATE, which has synthetic data on the housing market near Chicago. Suppose you wanted to create a new variable that tells us the average price per square feet.

									PivotTable Analyze	Design		ell me what you										
Ph Pr	otTable Na otTable5 Options PivotTable	me:	Active Fiel	d: Dril Dril Dow Act	n Up ~ ive Field	t Expand Field ⊡ Collapse Field	→ Group Select IIII Ungroup III Group Field Group	ion Ir S	sert Insert Fil licer Timeline Conne Filter	ter R	efresh Chan Sou Data	ige Data Cle	ar Select Move PivotTable Actions	Fields, Ite & Sets Ca	c	hips Pivot	Chart Recomm PhyotTa Tools	Field +/- List Buttons Show	Field Headers			~
Т		Ŧ	: ×	$\sqrt{-f_X}$										Ca	Iculated [tem							÷
1	A B	c	D	E	F	G	н	1	J	к	L	м	Ν	Sol 現 Lis	lve Order t Formulas		R S	5 T	U	v w x y •	PivotTable Fi	elds ~ ×
2	ID	Sta	te Coun	ty City	ZIP Cod	e Street Address	s Bedrooms I	Bathroon	ns Asking Price	fear Built	AC	Garage Space	es Days on Market	L Cn	eate Set Based on <u>R</u> ow	Items	HOA	Colu	nn Labels 💌		Choose fields to add to	report: Ö -
з	5933	18 IL	. Coo	k Chicago	60601	123 Main St	3	2.5	\$450,000.00	1990	Yes	2	30				250	Row Labels 💌	1	2345		
4	9478	87 IL	Cool	k Chicago	60602	456 Elm St	4	3	\$ 600,000.00	1985	Yes	2	45		anage sets		300	Chicago			Search	م
5	6214	13 IL	Cool	k Evanstor	60201	789 Oak St	5	4	\$ 750,000.00	2005	Yes	3	60	10000	Single Family	2017	350	Evanston			D	
6	2922	14 IL	Coo	k Oak Park	60301	101 Maple Ave	2 3	2	\$350,000.00	1950	Yes	1	20	6000	Single Family	2010	0	Oak Park			State	
7	5453	i6 IL	Coo	k Skokie	60076	202 Pine St	4	2.5	\$ 550,000.00	1988	Yes	2	35	7200	Single Family	2012	0	Skokie			County	
8	169	8 IL	Cool	k Wilmette	60091	303 Cedar St	5	3.5	\$ 850,000.00	1995	Yes	3	50	9500	Single Family	2019	400	Wilmette			City	
9	2475	i5 IL	Coo	k Chicago	60603	404 Walnut St	2	1	\$ 300,000.00	1920	Yes	1	15	5000	Condo	2014	500	Grand Total			Street Address	
10	6923	13 IL	Coo	k Chicago	60604	505 Cherry St	1	1	\$ 200,000.00	1935	No	0	10	3500	Condo	2012	450			_	Bedrooms	
11	9010	18 11	Cool	k Evanstor	60202	606 Birch St	3	2	\$400,000.00	1965	Yes	1	25	5500	Insert Calculated	d Field			? X		Bathrooms	
12	2030	12 IL	Cool	k Oak Park	60302	707 Redwood S	St 4	3	\$ 500,000.00	1978	Yes	2	40	6800	Name: \$ per si	qft			Add		Asking Price	•
13	4201	19 IL	Coo	k Skokie	60077	808 Spruce St	3	2	\$ 350,000.00	1980	Yes	1	30	6000	Formula: ='Askir	ng Price'/ 'Lot Si	28		Delete		Drag fields between an	eas below:
14	2837	77 IL	Coo	k Wilmette	60092	909 Cedar St	4	3	\$ 650,000.00	1992	Yes	2	55	8000							T Filters	III Columns
15	6367	78 IL	Coo	k Chicago	60605	1010 Pine St	2	2	\$ 280,000.00	2000	Yes	1	18	4500	Eields:							Redrooms T
16	3195	i8 IL	Cop	k Chicago	60606	1111 Oak St	1	1	\$ 190.000.00	1955	No	0	12	3500	Year Built AC							
17	3652	7 11	Coo	k Evanstor	60203	1212 Maple St	4	3.5	\$ 550.000.00	1986	Yes	2	38	7000	Garage Spaces							
10	6432	NG 11	Coo	k Oak Park	60303	1313 Elm St	3	2	\$ 320.000.00	1960	Yes	1	22	5200	Lot Size		- 1					
10	4085	14 11	Con	k Skokie	60078	1414 Birch St	2	1	\$ 270,000,00	1952	Yes	1	28	4800	Renovation							
19	4003		Cool	k Wilmette	60093	1515 Pedwood	st 5		\$ 750,000,00	2002	Yes	,	50	9500	HOK		Incert Eield					
20	612/			k Chicaro	60607	1616 500000 51			\$ 490,000,00	1902	Vor	2	25	6000	1		manninga					
21	0721	2 11		k Chicago	60609	1717 Codar St		2.5	\$ 550,000,00	1975	Vor	2	35	7200	1			ОК	Close		Rows	Σ Values
22	104	0 10		k Cristago	60000	1918 Dires St			\$ 430,000.00	1060	Ves	2		5200	Cinala Camilu	2012				- 11	City •	
23	104:			k Evalistor	00204	1010 Pille St	2	-	3420,000.00	1905	Tes		32	5000	Single Family	2015						
24	0285	·/ 11	. 000	K Oak Park	00304	1919 Oak St	2	1	\$ 300,000.00	1900	tes	1	18	5000	Single Family	2011						
25	980.	50 IL	. 000	k skokie	00079	2020 Elm St	4	2.5	5 520,000.00	1992	res	2	38	0000	single Family	2017						
26	5915	18 IL	. Coo	k wilmette	≥ 60094	2121 Walnut St	τ 6	4.5	\$ 800,000.00	2006	res	3	55	12000	Single Family	2021	500					
27	577.	80 IL	. Coo	k Chicago	60609	2222 Cherry St	t 3	2	\$ 350,000.00	1985	Yes	2	30	6000	Single Family	2016	0					
20	4499	7 1	Coo	k Chicago	60610	2323 Birch St	2	2	\$400,000,00	1970	Yes	1	25	5500	Condo	2013	450					

Figure 9: Calculated Fields

After creating an appropriate PivotTable, left click on any cell in the PivotTable, navigate to the PivotTable Analysis tab that is made available after creating and selecting a PivotTable. Then, select Fields, Items, & Sets, and then Calculated Fields. This will result in a new pop-up window in the green box where we can specify the new variable we want to add.

In this case, we wanted to add the asking price per square foot of the property. So, we first change the name to match the description of the variable. Then we can set up the formula either by typing it directly, or selecting them from the list of variables given in the pop-up window.

	(н	1	J	к	L	м	N	0	р	Q	R	s	т		U	v	w	х	Y	Z		AA
1												_										_
2	Bedroom	s Bathrooms	Asking Price	Year Built		Garage Spaces	Days on Market		Home Type		HOA	Sum	of\$perso	aft Col	umn Labels 💌							
3	3	2.5	\$450,000.00	1990	Yes	2	30	7500	Single Family	2015	250	Row	Labels	¥	1	2	3	4	5		5 Gran	d Total
4	4	3	\$600,000.00	1985	Yes	2	45	8500	Single Family	2018	300	Chica	ago	\$	55.71	\$65.33	\$65.64	\$73.25	#DIV/0!	#DIV/0!	\$	66.43
5	5	4	\$ 750,000.00	2005	Yes	3	60	10000	Single Family	2017	350	Evan	ston		#DIV/0!	#DIV/0!	\$72.57	\$77.46	\$75.00	#DIV/0!	\$	75.21
6	3	2	\$ 350,000.00	1950	Yes	1	20	6000	Single Family	2010	0	Oak I	Park		#DIV/0!	\$60.00	\$66.86	\$73.53	#DIV/0!	#DIV/0!	\$	67.24
7	4	2.5	\$550,000.00	1988	Yes	2	35	7200	Single Family	2012	0	Skok	ie		#DIV/0!	\$56.25	\$58.33	\$76.44	#DIV/0!	#DIV/0!	\$	69.94
8	5	3.5	\$850,000.00	1995	Yes	3	50	9500	Single Family	2019	400	Wilm	nette		#DIV/0!	#DIV/0!	#DIV/0!	\$81.25	\$84.21	\$66.67	Ś	78.21
9	2	1	\$ 300,000.00	1920	Yes	1	15	5000	Condo	2014	500	Gran	d Total	\$	55.71	\$62.50	\$66.67	\$76.18	\$81.03	\$66.67	Ś	71.14
10	1	1	\$ 200.000.00	1935	No	0	10	3500	Condo	2012	450											

Figure 10: Calculated Fields with Errors

Resolving the #DIV/0! Error

In Figure 10, you will notice that there are a number of #DIV/0! errors. For instance, the value for one bedroom apartments in Evanston is #DIV/0!. This happened because there are no single bedroom apartments in Evanston, and thus Excel tried to fill the slot with $\frac{0}{0}$, which is undefined.



Figure 11: Correcting Errors in Pivot Tables

Left click on any of the #DIV/0! cells, right click, and then select PivotTable Options. In the new pop-up window, select the Layout & Format tab, and edit the options in the orange box. If you leave the box blank, any cells with error outputs will return an empty cell.

1	С	D	E	F	G	н	1	J.	K	L	М	N	0	P	Q	R	S T		U	V	W	Х	Y	Z	AA
1	State	County	City	ZIP Code	Street Address	Bedrooms	Bathrooms	Asking Price	Year Built	AC	Garage Spaces	Days on Market	Lot Size	Home Type	Renovation	HOA	Sum of \$ per s	iqft Columi	n Labels 💌						
3	IL.	Cook	Chicago	60601	123 Main St	3	2.5	\$450,000.00	1990	Yes	2	30	7500	Single Family	2015	250	Row Labels	¥	1	2	3	4	5	6	arand Total
4	IL.	Cook	Chicago	60602	456 Elm St	4	3	\$600,000.00	1985	Yes	2	45	8500	Single Family	2018	300	Chicago	\$	55.71	\$65.33	\$65.64	\$73.25			\$ 66.43
5	IL.	Cook	Evanston	60201	789 Oak St	5	4	\$750,000.00	2005	Yes	3	60	10000	Single Family	2017	350	Evanston				\$72.57	\$77.46	\$75.00		\$ 75.21
6	IL.	Cook	Oak Park	60301	101 Maple Ave	3	2	\$350,000.00	1950	Yes	1	20	6000	Single Family	2010	0	Oak Park			\$60.00	\$66.86	\$73.53			\$ 67.24
7	IL.	Cook	Skokie	60076	202 Pine St	4	2.5	\$550,000.00	1988	Yes	2	35	7200	Single Family	2012	0	Skokie			\$56.25	\$58.33	\$76.44			\$ 69.94
8	IL.	Cook	Wilmette	60091	303 Cedar St	5	3.5	\$850,000.00	1995	Yes	3	50	9500	Single Family	2019	400	Wilmette					\$81.25	\$84.21	\$66.67	\$ 78.21
9	IL.	Cook	Chicago	60603	404 Walnut St	2	1	\$300,000.00	1920	Yes	1	15	5000	Condo	2014	500	Grand Total	\$	55.71	\$62.50	\$66.67	\$76.18	\$81.03	\$66.67	\$ 71.14
10	IL.	Cook	Chicago	60604	505 Cherry St	1	1	\$200,000.00	1935	No	0	10	3500	Condo	2012	450									
11	IL.	Cook	Evanston	60202	606 Birch St	3	2	\$400,000.00	1965	Yes	1	25	5500	Single Family	2005	0									
12	IL.	Cook	Oak Park	60302	707 Redwood St	4	3	\$500,000.00	1978	Yes	2	40	6800	Single Family	2015	0									
13	IL.	Cook	Skokie	60077	808 Spruce St	3	2	\$350,000.00	1980	Yes	1	30	6000	Single Family	2012	0									
14	IL.	Cook	Wilmette	60092	909 Cedar St	4	3	\$650,000.00	1992	Yes	2	55	8000	Single Family	2016	300									
15	IL.	Cook	Chicago	60605	1010 Pine St	2	2	\$ 280,000.00	2000	Yes	1	18	4500	Condo	2010	350									

Figure 12: Corrected Errors in PivotTables

Topic 4. PivotTables: "Dividing" PivotTables

The use of filters in PivotTables also allows you to generate PivotTables across multiple sheets each corresponding to an item on the filter. Lets update the PivotTable we have in worksheet PIVOT-CREATE to the form you see in Figure 13. There were 5 cities in our data, and suppose we want to create a PivotTable telling us what the average price per sqft is for houses with 1,2,...,6 bedrooms in each city.

F	le H	ome Inse	ert Page	Layout Formul	as Data F	Review	View Automate	Help	PivotTab	le Analyze	Design								(🖓 Comments 🛛 🖒 Share 🕞
Pi	votTable ivotTable	Name: Ac 5 G	tive Field: ity Field Settin	Drill Drill Drill Drill Down Up ~	*팬 Expand Fi "팬 Collapse I	ield Field	→ Group Selection 聞 Ungroup 団 Group Field	Insert Slicer	Insert Timeline	Filter Connections	Refresh Change Data	Clear	Select Move PivotTable	fields, Items, & Sets ~	OLAP Relation	onships PivotCha	t Recommended PrivotTables	Field List Buttons Heade	3	
L.C	17 Op	tions		Active Field			Group		Filter		Data		Actions	c	alculations		Tools	Show	-	~
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1	V Ger	erate GetPiv	ntData	G	н	1	J.	к	L L	M	N	0	Р	0	R	S T	U	V VA		
1				<u> </u>												City	(All)	v	PivotTable Fields	s v x
2	County	City	ZIP Code	Street Address	Bedrooms E	Bathroo	ms Asking Price	rear Built		Garage Sp	aces Days on Market	Lot Size	Home Type	Renovatio	n HOA				Choose fields to add to repo	art: 🐻 🗸
з	Cook	Chicago	60601	123 Main St	3	2.5	\$450,000.00	1990	Yes	2	30	7500	Single Family	2015	250	Row Labels	Average of \$ pr	er sqft		
4	Cook	Chicago	60602	456 Elm St	4	3	\$600,000.00	1985	Yes	2	45	8500	Single Family	2018	300	1	\$	55.71	Search	م
5	Cook	Evanston	60201	789 Oak St	5	4	\$ 750,000.00	2005	Yes	3	60	10000	Single Family	2017	350	2	\$	62.50	0	
6	Cook	Oak Park	60301	101 Maple Ave	3	2	\$350,000.00	1950	Yes	1	20	6000	Single Family	2010	0	3	\$	66.67	State	
7	Cook	Skokie	60076	202 Pine St	4	2.5	\$550,000.00	1988	Yes	2	35	7200	Single Family	2012	0	4	\$	76.18	County	
8	Cook	Wilmette	60091	303 Cedar St	5	3.5	\$850,000.00	1995	Yes	3	50	9500	Single Family	2019	400	5	s	81.03	ZIP Code	
9	Cook	Chicago	60603	404 Walnut St	2	1	\$ 300,000.00	1920	Yes	1	15	5000	Condo	2014	500	6	\$	66.67	Street Address	
10	Cook	Chicago	60604	505 Cherry St	1	1	\$ 200,000.00	1935	No	0	10	3500	Condo	2012	450	Grand Total	\$	71.14	Bedrooms	
11	Cook	Evanston	60202	606 Birch St	3	2	\$400,000.00	1965	Yes	1	25	5500	Single Family	2005	0				Bathrooms	
12	Cook	Oak Park	60302	707 Redwood St	4	3	\$500,000.00	1978	Yes	2	40	6800	Single Family	2015	0				Year Built	
13	Cook	Skokie	60077	808 Spruce St	3	2	\$ 350,000.00	1980	Yes	1	30	6000	Single Family	2012	0				AC	
14	Cook	Wilmette	60092	909 Cedar St	4	3	\$650,000.00	1992	Yes	2	55	8000	Single Family	2016	300				Garage Spaces	
15	Cook	Chicago	60605	1010 Pine St	2	2	\$ 280,000.00	2000	Yes	1	18	4500	Condo	2010	350				Davs on Market	•
16	Cook	Chicago	60606	1111 Oak St	1	1	\$ 190,000.00	1955	No	0	12	3500	Condo	2015	400				Drag fields between areas b	elow:
17	Cook	Evanston	60203	1212 Maple St	4	3.5	\$ 550,000.00	1986	Yes	2	38	7000	Single Family	2018	0				T Filters	III Columns
18	Cook	Oak Park	60303	1313 Elm St	3	2	\$ 320,000.00	1960	Yes	1	22	5200	Single Family	2012	0				City ~	
19	Cook	Skokie	60078	1414 Birch St	2	1	\$270,000.00	1952	Yes	1	28	4800	Single Family	2014	0					
20	Cook	Wilmette	60093 :	515 Redwood St	5	4	\$ 750,000.00	2002	Yes	3	50	9500	Single Family	2020	400					
21	Cook	Chicago	60607	1616 Spruce St	3	2.5	\$480,000.00	1998	Yes	2	35	6000	Single Family	2016	0			_		
22	Cook	Chicago	60608	1717 Cedar St	4	3	\$ 550,000.00	1975	Yes	2	40	7200	Single Family	2015	0			_		
23	Cook	Evanston	60204	1818 Pine St	3	2	\$420,000.00	1968	Yes	2	32	5800	Single Family	2013	0				Rows	Σ Values
24	Cook	Oak Park	60304	1919 Oak St	2	1	\$ 300,000.00	1955	Yes	1	18	5000	Single Family	2011	0			_	Bedrooms ~	Average of \$ per sqft ~
25	Cook	Skokie	60079	2020 Elm St	4	2.5	\$ 520,000.00	1992	Yes	2	38	6800	Single Family	2017	0					
26	Cook	Wilmette	60094	2121 Walnut St	6	4.5	\$ 800,000.00	2006	Yes	3	55	12000	Single Family	2021	500					
27	Cook	Chicago	60609	2222 Cherry St	3	2	\$ 350,000.00	1985	Yes	2	30	6000	Single Family	2016	0					

Figure 13: New Pivot Table in PIVOT-CREATE

Navigate to the **PivotTable Analyze**, and click on Options, and then select Show Report Filter **Pages**. This will automatically create 5 worksheets with a mini PivotTable of each city in the dataset.