

4.2a Quality issues: exploiting VAT data

Tim Jones
SIAP consultant/lecturer

Objectives

After this session, participants will be aware of:

- How VAT operates
- How VAT data compares with survey data
- Some difficulties to be overcome
- The need for a processing system
- An example of VAT processing in Excel
- An example of estimating GVA for one activity

Value added tax (VAT)

- VAT is an SNA “tax on products”, implemented in many countries, covering a wide range of activities
- It is levied by the Revenue Authorities in two ways
 - On imports (by Customs)
 - On local value added by registered VAT traders
- Registered VAT traders collect “output” VAT on their sales and may deduct “input” VAT on their imports or purchases from other VAT traders
- Essentially it is a tax on final consumption

Exploiting VAT data

- Customs data is the source of external trade statistics
- So why not VAT data for output?
- Returns are made quarterly (if not monthly)
- Revenue authorities often capture the data and store them in a database
- The VAT traders must be classified by activity (ISIC or equivalent)

Why is VAT data better than a survey?

- A census of VAT traders every quarter/month
- VAT return is like a simple survey questionnaire
- Provided to the revenue authority free
- Up-to-date business register not required
- Births and deaths automatically accounted for
- Severe non-response penalties
- Costs of survey can be saved

Some caveats

- The Revenue Authorities may not cooperate
 - But the Finance/Economy Minister could intervene
- MoF Revenue & Database totals may not agree
 - If large, the differences should be investigated
- The database may not be complete
 - But the coverage could be assessed
- VAT traders may not be well coded by activity
 - But a special exercise could fix this problem

Processing VAT data

- A processing system is required
 - to receive the data every quarter
 - to validate it (by comparing with previous quarters)
 - to aggregate it into NA categories
 - possibly to adjust it to account for better coverage
- An example Excel workbook shows how aggregated VAT data is adjusted for better coverage in one country...

Number of VAT traders

On these slides the formula box is magnified

The screenshot shows an Excel spreadsheet with the following data:

WEEKDAY																				
		2009 Q3	2009 Q4	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2011 Q1	2011 Q2	2011 Q3	2011 Q4	2012 Q1	2012 Q2	2012 Q3	2012 Q4					
1	Quarterly VAT data																			
2																				
3		TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE					
4																				
5	CPA Number of VAT traders	2.2%	2.2%	3.1%	2.4%	2.3%	2.0%	2.5%	1.8%	1.8%	1.7%	1.1%	1.1%	1.5%	1.1%					
6	T Total	26,014	26,599	27,427	28,074	28,730	29,294	30,029	30,580	31,134	31,668	32,028	32,393	32,893	33,251					
7	A1 Agriculture and forestry	61	60	62	64	66	67	67	66	64	66	64	66	64	64					
8	A2 Livestock & livestock products; fishing	5	6	6	6	6	6	7	7	7	7	7	8	7	8					
9	B0 Mining and quarrying	44	46	48	48	47	50	52	54	54	56	55	57	59	61					
10	C1 Manufacture of food products	569	580	586	590	602	613	617	631	636	644	647	659	662						
11	C2 Manufacture of beverages & tobacco	61	64	64	66	67	66	67	67	70	72	74	72	73	73					
12	C3 Manufacture of textiles, clothing & leather	407	418	418	427	434	434	438	437	441	446	444	449	449	448					
13	C4 Manufacture of wood & paper products; printing	517	526	546	556	571	582	603	616	626	637	653	657	662	674					
14	Manufacture of petroleum, chemicals, rubber & plastics	191	402	419	427	431	434	437	441	444	446	449	449	448						

VAT turnover

Material\Quality\[PROC VAT.xlsx]SummQ!Z64

AB AC AD AE AF AG AH AI AJ

SUM VAT - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Easy Document Creator

Clipboard Font Alignment Number Styles Cells Editing

WEEKDAY =C:\Users\Tim\Documents\2 Work\C Training material\Quality\[PROC VAT.xlsx]SummQ!Z64

			2009	2009	2010	2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012	
			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Quarterly VAT data																			
2																				
3			2009Q3	2009Q4	2010Q1	2010Q2	2010Q3	2010Q4	2011Q1	2011Q2	2011Q3	2011Q4	2012Q1	2012Q2	2012Q3	2012Q4				
4			TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE				
58	Turnover of VAT traders																			
59	CPA Billions of currency units		TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
60	T Total		19,131	20,437	18,729	20,138	21,429	23,663	19,367	22,221	25,211	24,770	22,207	24,460	25,516	26,631				
61	A1 Agriculture and forestry		19	22	29	19	13	12	19	16	14	13	17	12	12	11				
62	A2 Livestock & livestock products; fishing		8	7	5	7	9	8	6	7	6	9	6	9	9	9				
63	B0 Mining and quarrying		14	15	9	13	15	17	12	15	22	22	19	24	23	27				
64	C1 Manufacture of food products		547	515	577	625	640	598	667	709	730	683	707	738	799					
65	C2 Manufacture of beverages & tobacco		178	140	118	172	197	160	127	183	197	160	129	205	221	181				
66	C3 Manufacture of textiles, clothing & leather		95	125	84	97	102	118	92	106	107	125	93	103	102	124				

New VAT traders already existing

Quality\[PROC VAT FD.xlsx]SummQFD!Z118

AB AC AD AE AF AG AH AI AJ AK

SUM VAT - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Easy Document Creator

Clipboard Font Alignment Number Styles Cells Editing

WEEKDAY =C:\Users\Tim\Documents\2 Work\C Training material\Quality\[PROC VAT FD.xlsx]SummQFD!Z118

			2009	2009	2010	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012		
			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Quarterly VAT data																			
2	First declarations																			
3			2009Q3	2009Q4	2010Q1	2010Q2	2010Q3	2010Q4	2011Q1	2011Q2	2011Q3	2011Q4	2012Q1	2012Q2	2012Q3	2012Q4				
4			TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE				
111	Existing traders																			
112	CPA Numbers																			
113																				
114	T Total		176	151	399	207	189	171	355	218	182	179	356	143	136	125				
115	A1 Agriculture and forestry		-	-	1	1	1	2	-	-	-	1	-	-	-	-				
116	A2 Livestock & livestock products; fishing		-	-	-	-	-	-	-	-	-	-	-	1	-	-				
117	B0 Mining and quarrying		1	1	1	-	-	2	1	-	-	-	1	1	1	2				
118	C1 Manufacture of food products		4	3	2	1	3	7	-	-	4	-	5	1	1	1				
119	C2 Manufacture of beverages & tobacco		1	-	1	-	-	1	1	-	-	1	-	-	-	-				

Adjusted turnover index

Font Alignment Number

$=Y10*(SummQ!Z64-Z64)/SummQ!Y64$

B C Z AA AB AC AD

SUM VAT - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Easy Document Creator

Clipboard Font Alignment Number Styles Cells Editing

WEEKDAY

	2009	2009	2010	2010	2010	2010	2011	2011	2011	2011	2011	2012	2012	2012	2012	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
1	Quarterly VAT data															
2																
3																
4	Adjusted turnover index (VAT traders)															
5	CPA 2004 Q1 = 100															
6	T Total															
7	A1	427	197	232	304	195	134	129	194	167	144	130	171	127	126	117
8	A2	400	305	269	210	268	357	335	235	283	248	351	251	354	377	354
9	B0	704	461	477	274	423	424	541	382	478	715	717	614	779	717	872
10	C1	442	310	199	187	210	227	232	217	242	257	265	248	256	268	290
11	C2	603	301	237	200	291	333	270	214	310	334	270	219	346	373	306
12	C3	507	162	213	144	165	174	201	156	181	182	212	158	174	174	210
13	C4	481	193	210	192	209	224	223	181	200	213	219	183	196	215	230
14	C5	467	196	192	181	223	200	198	183	227	222	208	175	239	208	218

Quarterly to annual aggregation

Font Alignment Number

$=IF(G$1,100*SUMIF(SummQadJ!$1:$1,G$2,SummQadJ!10:10)/SummQadJ!$C10,NA())$

B F G H I J

SUMIF(range, criteria, [sum_range])

SUM VAT - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Easy Document Creator

Clipboard Font Alignment Number Styles Cells Editing

WEEKDAY

$=IF(G$1,100*SUMIF(SummQadJ!$1:$1,G$2,SummQadJ!10:10)/SummQadJ!$C10,NA())$

	2004	2005	2006	2007	2008	2009	2010	2011	2012	
1	Annual VAT data									
2										
3										
4	Adjusted turnover index (VAT traders)									
5	CPA 2004 Q1 = 100									
6	T Total									
7	A1	100	112	105	135	150	190	178	149	127
8	A2	100	113	67	104	137	215	292	279	334
9	B0	100	91	108	172	170	224	243	325	423
10	C1	100	105	105	152	163	169	194	222	240
11	C2	100	108	107	121	146	161	181	187	206
12	C3	100	97	99	113	131	132	135	144	141
13	C4	100	108	110	128	157	158	176	169	171
14	C5	100	107	115	139	191	156	172	180	180
15	C6	100	114	89	123	163	178	187	203	207

Estimating GVA

- Another example workbook shows how estimates of GVA may be constructed for a given activity in a transparent manner
- The estimates are made at current and constant prices simultaneously, using value and quantity indicators to extrapolate a benchmark
- The country concerned did not have any quarterly or annual enterprise data

Estimates of GVA

		BM	2006	2006Q1	2006Q2	2006Q3	2006Q4	2007Q1	2007Q2	2007Q3	2007Q4	2008Q1	2008Q2	2008Q3
Quarterly estimates														
Production account	ISIC	2006												
Chemicals, etc	DE													
check														
	Current prices													
	Total output at basic prices		19.0	4.6	4.7	4.9	4.8	4.7	4.9	5.2	5.0	5.2	5.7	6.0
	less intermediate consumption		11.5	2.8	2.9	2.9	2.9	2.9	3.0	3.1	3.0	3.1	3.5	3.7
	GVA at basic prices		7.5	1.8	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.3	2.4
	Constant prices													
	Total output at basic prices													
	less intermediate consumption													
	GVA at basic prices		7.5	1.8	1.8	2.0	1.8	1.8	1.9	2.0	1.8	1.8	1.9	2.0
	Quantity index numbers		100	24	25	27	24	24	25	27	24	23	26	26
	Change							1%	3%	-1%	-1%	-4%	0%	-1%
	Deflator		100	100	101	96	104	102	102	103	108	116	118	122
	Formal GVA		6.8	1.6	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	2.1	2.2
	Informal GVA		0.7	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2

Total output and value indices

Quarterly estimates				2006	2006	2006	2006	2007	2007	2007	2007		
Production account				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
Chemicals, etc				DE									
check													
				BM	2006	2006Q1	2006Q2	2006Q3	2006Q4	2007Q1	2007Q2	2007Q3	2007Q4
51	TRUE	Total output CP		18,952	18,952	4,588	4,712	4,853	4,799	4,733	4,909	5,180	4,909
52	TRUE	Soap		2,168	2,168	537	533	576	521	394	615	734	401
53	TRUE	Other chemicals etc		14,967	14,967	3,602	3,727	3,817	3,820	3,938	3,800	3,897	4,008
54	TRUE	Informal		1,817	1,817	450	452	459	=C54*H5	401	494	549	401
55	TRUE	New/adjust											
Value indices													
58		Other chemicals etc		100		24	25	26	26	26	25	26	
59		Informal		100		25	25	25	25	22	27	30	
Quantity indicators													

Quantity and price indicators

Quarterly estimates				2006	2006	2006	2006	2007	2007	2007	2007		
Production account				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
Chemicals, etc				DE									
check													
				BM	2006	2006Q1	2006Q2	2006Q3	2006Q4	2007Q1	2007Q2	2007Q3	2007Q4
58		Other chemicals etc		100		24	25	26	26	26	25	26	
59		Informal		100		25	25	25	25	22	27	30	
Quantity indicators													
62		Soap		100		25	24	28	23	18	28	33	
63		Other chemicals etc	V/P	100		24	25	27	=100*H58	26	25	25	
64		Informal		100%		25	25	26	24	22	27	29	
65		Soap		50%		25	24	28	23	18	28	33	
66		Population		50%		25	25	25	25	25	26	26	
Price indices (Basic prices)													
69		Other chemicals etc	data	100		100	101	95	104	102	102	103	

Data sheet

Summary!IH22

BM Year	2006	2006	2006	2006	2007	2007	2007	2007	2008	2008	2008		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3		
Quantities	6,428	1,590	1,565	1,786	1,488	1,145	1,790	2,112	1,300	2,698	1,317	1,342	
Value (estimated)	2,168	537	533	576	521	394	615	734	476	1,080	523	551	
Alternative price	3.379	338	341	323	351	344	343	348	366	393	397	410	
VAI data	17,134	4,139	4,260	4,393	4,342	4,332	4,415	4,631	4,527	4,442	5,203	5,510	
Chemicals	8,596	2,215	2,254	2,155	1,971	2,055	2,038	2,116	1,900	2,105	2,514	2,585	
Rubber and plastics	8,539	1,924	2,006	2,238	2,371	2,277	2,377	2,515	2,627	2,337	2,689	2,945	
Total excluding soap	14,967	3,602	3,727	3,817	3,820	3,938	3,800	3,897	4,051	3,382	4,680	4,959	
Populatic Total pop index	100	25	25	25	25	25	26	26	26	26	26	26	
Price indices (Basic prices)													
Producer price for chemicals, etc	218	100	100	101	95	104	102	102	103	108	116	118	121
Chemicals	172	100	101	102	94	103	101	101	102	109	118	119	119
Plastics	45	100	95	97	102	105	104	103	105	107	108	113	129

Soap data

=SUMIF(\$A\$14:\$A\$25,\$B11,\$K\$14:\$K\$25)

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Quantity (tonnes)	6,393	5,818	6,299	7,793	7,146	6,235	#N/A	6,428	6,348	6,676	3,767	#N/A
Q1	1,507	1,658	1,341	1,978	1,966	1,555	#N/A	1,590	1,145	2,698	1,258	#N/A
Q2	1,581	1,564	1,431	1,820	1,739	1,597	#N/A	1,565	1,790	1,317	750	#N/A
Q3	1,663	1,665	1,832	2,175	1,902	1,612	#N/A	1,786	2,112	1,342	784	#N/A
Q4	1,643	1,030	1,695	1,820	1,538	1,472	#N/A	#SUMIF(S	1,300	1,319	975	#N/A
Q1 Jan	527	561	501	721	908	575	#N/A	578	400	1,066	497	#N/A
Q1 Feb	494	581	343	657	502	457	#N/A	481	341	858	426	#N/A
Q1 Mar	485	516	497	601	556	523	#N/A	530	404	774	336	#N/A
Q2 Apr	548	463	460	640	597	518	#N/A	509	472	519	243	#N/A
Q2 May	491	552	473	553	554	526	#N/A	514	612	431	241	#N/A
Q2 Jun	542	550	496	626	587	554	#N/A	542	706	367	266	#N/A
Q3 Jul	594	581	643	746	711	539	#N/A	669	778	451	289	#N/A
Q3 Aug	531	524	652	739	714	593	#N/A	487	805	452	247	#N/A
Q3 Sep	538	460	537	689	477	480	#N/A	630	529	439	248	#N/A
Q4 Oct	632	375	673	851	562	475	#N/A	492	470	398	295	#N/A
Q4 Nov	519	345	636	527	464	479	#N/A	479	397	463	299	#N/A
Q4 Dec	492	310	386	442	512	517	#N/A	516	433	458	381	#N/A

Questions for discussion

- Apart from the caveats mentioned, what other problems would you face in exploiting VAT data?
- What are the main quality characteristics of the GVA estimates in the example?
- How transparent is your estimation system?