

Swati: Good afternoon, everyone. My name is Swati and I am a training production director with Informa. I am delighted to welcome you all to an informative webinar on performing break-even analysis in Excel. This webinar will be led today by our own speaker, Danielle Stein Fairhurst. She is the principal of Plum Solutions, a Sydney-based consultancy specialising in Excel modelling and analyses. Before we proceed with the webinar, I would like to give you some details on the housekeeping for the next 45 minutes.

The slides that you will see will be available on the SlideShare page, and the link will be emailed to you. The recording of the webinar will be available to download and the link will be emailed in a day or two. Please take the time to complete the post-webinar survey that will pop-up at the end of the webinar. You can type your questions throughout the session. And time will be allocated in the end for the speaker to address your questions. And now, I will hand over your speaker for today, Danielle, who will be taking about performing break-even analysis in Excel.

Danielle: Thank you very much, Swati. I am very excited to be here. Just a little bit about myself, I am based in Sydney in Australia. I am very happy to come over here a couple of times a year to Dubai. I enjoy coming here and I am very happy to be back here again. It's quite nice to escape the heat in Sydney! It's been very hot in Australia and coming over here, I found a very unusual situation where it's been very rainy and we've had a thunderstorm this morning, which is exciting. I have never seen one of these in Dubai before, so it's fantastic to be here. I am running a Financial Modelling Using Excel course, which is five days, here in one of the hotels in Dubai, which I run a couple of times a year for Informa. It's always quite a popular course and when Swati asked me to do the webinar, I thought I would cover a topic of break-even analysis in Excel.

So, break-even analysis is really a sub-set of financial modelling. It's something that we often need to do. If you are working in finance, we often need to do is to calculate what the break-even point is and we often do that using Excel. The reason that we would do it is, for example if you are doing a new product launch, if you are trying to decide how many of units you need to produce such that you could make a profit. How many do we need to sell and how many do we need to produce? It can help you—also, if you are thinking about getting rid of a product as well, it's quite useful for decision analysis performing the break-even. So, you can see in the chart here, it's the point at which it becomes profitable so the number of units at which our profitability is viable really.

How does it kind of fit with Excel and with financial modelling, I mean, we pretty much always do break-even using Excel. When we do break-even, it needs to be dynamic, it needs to be flexible and we need to be able to update it very quickly and easily. We often do it using scenarios, and really the whole point of financial modelling is having inputs and outputs, so, if you change the inputs, the outputs change and really, that's the whole point of financial modelling. Quite often,

a financial modelling in Excel will contain some kind of break-even analysis. It could be the purpose of the financial model or it could just be a small part of the financial model that we have created. Quite often, we will be doing scenarios as a part of financial modelling and often we would break-even and that can change quite a bit, so, as our inputs change, you might find that your break-even point will change as well. So, being able to do that quickly and easily is really the whole point of doing it in Excel.

What I would like to talk to you about today and the whole purpose of the webinar is to show you how to do that in Excel, so, I imagine a lot of you guys use Excel already. You're probably already doing a bit of financial modelling or you might be quite new to it and wanting to learn a bit more about it. There are three different ways that I would like to go over with you. I've got a couple of case studies to cover with you very briefly.

The first method of break-even I am going to cover with you is using a chart. That's a very visual—of calculating break-even. It's not very accurate but it's just a way—quite often if you want to visually show what you break-even is, you can do that using a chart. The second way is using a formula and the formula we use is to look at the difference between the selling price and the variable cost which will give us a contribution and see how many times we need to sell those in order to cover the fixed cost. So, that formula is the fixed cost about the selling price less variable cost. So, we can do that using a very simple Excel formula and the last method is using a Goal Seek. So, that's just a little tool in Excel which I will show you how to use as well.

We are going to do a case study, just a very short one. Let's say for example, you've got a brilliant business idea, you are an entrepreneur. You think that making these swanky fancy bird cages would be a great business idea. So, you've done a little bit of analysis, and you have got your costings right. So, we know that in order to calculate break-even, we need to know a couple of different things. We need to know the fixed cost, we need the variable cost, the selling price and the volume.

Now, you can see on the slides that I have coloured the volume in a very strange looking format. It's actually using an input variable—if you are familiar with using Excel—it's one of the styles that's available on the home tab and when we flick over to Excel in a minute, I will show you what that looks like. One of the principles of this practice in financial modelling is to always format our input in such a way that you know it's an input without break-even, the volume is a variable input. The volume of a number of units that we need to purchase is the input that we don't know what that's going to be, that's why I formatted it like that. Anything that's a variable, we format that as an input.

So, as part of my book which is *Using Excel for Business Analysis*, there's a section on break-even and you will find that—if you have a copy of my book, you will find that on page 227.

So, let's just go over into Excel now and we will make this file available to you later on, if you would like to play around with this. And even if you go on to the supplementary content of the book, that I just talked about, some of these files or very similar files are available as well. So, you can easily download—we will make those available to you also.

So, let's firstly do the chart with break-even. What I am going to do here, I am just going to show how a fixed cost would look like on a chart. So, let's say for example we know that our fixed cost is about \$250,000, we've got some variable cost, some raw material, labour, overhead, so, our total cost per unit we know is going to be \$40. This selling price is \$100, we can get a \$100 per cage from this.

Let's have a look at what we think a break-even is going to look like. So, let's put in break-even, I'm just going to link that through there. I'm going to use my F4 shortcut, I will just copy that in like that and I will copy that across. I will just show as our fixed cost. Now, if we sell no cages, we are still going to have a fixed cost in \$250,000. If we sell a 1,000 cages, we have got a fixed cost of \$250,000, if we sell 2,000 cages. So, it doesn't matter how many cages we sell, we are still going to have exactly the same fixed cost.

I am going to show that on the chart, I am just going to go to Insert and just go in and show a very simple line chart. Now, line chart have got a mind of their own. So, when we create a line chart, it doesn't give us what we want. You can see here that I wanted the number of cages across the border, what it's given me is a separate line. So, what I am going to do is just go in here and get rid of that. That often happens. I've got 1, 2, 3, I don't want that. I want to have my number of cages across the bottom and I'm going to right-hand click here and go to Select Data, Edit my horizon like this, I don't call it the x-axis or y, and they have "dumbed" it down for us and called it the horizontal axis. Thank you, Excel. And I am going to show this as the number of units across the bottom like that. That shows us if we sell zero, one thousand, 2,000, 3,000 or 4,000, the fixed cost is going to be absolutely the same. I am just going to change my title here and call it the Break-Even Bird Cages, I am just going to change that there. There we go, so, that shows us what our fixed cost is going to be.

What I am going to do now is add in a variable cost and this is a little bit more interesting than the fixed cost. The variable cost is \$40 and I am going to use my F4 shortcut again and to put in my absolute referencing because I don't want that reference to change, I am going to multiply it by the number of cages sold up here. I don't need to worry about dollar signs or referencing for that and just copy that across. Now, what I want to do now is to add that to my chart. I can again

go to and right-hand click or I can be a little bit tricky and just copy that, click on the chart and CTRL+V and that will just add them both like that.

I don't like the way this is looking, I think the zero should look here, we should be there. You know, I want to line these up. So, I am just going to my chart and change the options because I feel this should be there and I don't really like this gap. What I am just going to do here, is just right hand click on the Axis here, go into Format Axis here and here where it says Axis Position and click on Tick on Marks, that looks better. I am happy with that. What I am going to do now is add in—calculate the total cost, add that like that and that gives us a total cost for our break-even analysis.

Our revenue, we can calculate that by the number of cages sold and multiply that by the selling price, so, F4 with that one, I want to fix my absolute referencing and copy that across like that. Our profit is going to be the total—the revenue, less the total cost, like that. So you can see, we have made a lovely profit there, very little, nothing then you can see my break-even point is going to just under 3,000.

We have got our fixed cost here, we have got some variable cost here. I want to show the total cost and I want to show the revenues. I am going to show this and add those. There's an awful lot of lines here, why don't I get rid of the variable cost? I don't think that's really necessary somehow. I am just going to click on that and dele—where did go? I was going to click on that single one there, that line, click away, you know what, I am going to do this the long way. Go to Select Data, and I will take away the variable cost and Remove it from there. Okay, so, what we can see here our fixed cost line is going across like that, our revenue like that and our total cost. So, our break-even point is basically where our total cost and our revenue intersect. So, this is the point here.

It's not very easy to do this in Excel, so, what I am going to do here is just do a little cheat's method and grab a little picture, go into here (Shapes), we are going to grab a line, and just do a little drop line in here. There we go, try and get it straight, something like that. That's good enough. You might want to group those if you want to be able to move the chart around and that's a very rough and ready way of showing a break-even analysis visually. So, we can see that it's just going to be under 3000 units for our break-even.

Now, I am going to go to the second method of calculating the break-even analysis. That's going to be part of the slides which you will see. Let's go into our formula. The break-even number of units here—this is a much simpler way of doing it which is just a simple formula. What we are going to do here is decide that our selling price is \$125, our variable cost was \$40, so that means the contribution of each unit is \$85. So, we want to know how many times is that covered by the

fixed cost, and then we will just divide that by that and we can see that it's 2,944 units. So that's a very quick way of calculating the exact number. I quite like doing both of those. I would probably show—I like the visuals when you are doing a break-even analysis and I also like to see the exact number.

Let's go to the third way and that's using the Goal Seek, probably one of my favourite methods here. What I have done is exactly the same case study except that I have sort of put in a dummy number here. So, let's say if we choose to produce 5,000 units, I have done a very quick of P&L here, which means we will make a profit of \$174,000. If I put 4,000—put that in red so that you can see it, if you go to your Styles, you can see that it has been formatted as an input, so, this is what I was talking about. Always show any kind of input we formatted as an input which can be found on the Home tab under Cell Styles—what about if I said you know, maybe just 2,000, okay, that's a start, we can see that we are making a bit of a loss. So, I could play around all day, yeah, I could keep changing my inputs but it's going to much quicker and easier if I go into my Goal Seek, it does show you in the book on page 185 how to do a Goal Seek.

You just go into What-if Analysis, go into Goal Seek and what we want to do here is to set your profits to zero, you need to—in order to do your Goal Seek—you need to have all your formulas already set up, you need to have of hard code number, which drives an output. So, as long as you have a link between a hard-coded number and your formula, your Goal Seek will work. What I want to do here is to set my profit to zero by changing the number of cages. And I will say OK, there we go. And I end up with 2,944, what do you know, it's exactly the number I got with the formulas.

Let's say for example my variable cost has changed, and that actually became \$32 for example, things have gone up, so, I could very easily go into my Goal Seek and I can run that again. So, I can set that to value zero By Changing Cell the cages produced, there we go, and you can see that my number of cages produced has increased a little bit to cover the increased amount for example.

Having to constantly go into that Goal Seek over time and having have to run it, I have done quite a bit of work for non-profits, with non-profits, you always want to have a profitability of zero, just like you do with the break-even analysis and you constantly want to run this Goal Seek. And that becomes a little bit tedious and so you forget how to do it, and then you try to remember, which is my input, which is my output. So, what we can often do, is create a Macro. You can set up a little button so that every time you hit the button, it will run the Goal Seek for you.

So, just coming back to our slides here. That was our chart, I just want to do another case study with you. That's just using a similar but a completely different example. Again, to calculate break-

even point, we need fixed cost, we need the variable cost, we need the selling price and we need the volume. Again, the volume is the variable input that we don't know yet. So, let's go back into Excel.

Another example here, we are producing pipes, it could any sorts of pipes, and we have got fixed cost that is here. We have got variable cost, we have got a selling price of \$25 per pipe and we want to know what our profitability is going to be. We think we are going to sell 20,000 pipes but we want to know what is that break-even point, what is that going to be? So, let's calculate it a couple of different ways. Again, using a very similar method. So, here we are going to say—we will do the formula—we will say the selling price minus the variable cost per unit which is \$10. For every single pipe that we sell we make \$10 on it. And we need to sell how many of these to cover our fixed cost, so 13,500. Here we go, that's using the formula.

If you want to use the Goal Seek, let's do that again quickly. Let's go into Goal Seek, set your profit to an amount of zero By Changing the volume. There we go, what do you know, we end up with exactly the same result as you would expect.

So, just coming back to our slides here, so, in summary, just to finish up for today, we've got three different methods of creating a break-even analysis in Excel. This can be part of a financial model or it could be part of a larger financial model, it could be a pricing model or it could be a financial model itself with the purpose of calculating break-even analysis. You can do all three of these in one single model or you can just choose to do one of those. Firstly, it is doing a chart, a graphic—probably one of my favourite methods because I always like to see visuals. I think that it is always nice to see, rather than having numbers, you know, it's much better. You can get your message across a lot better with a graph. Secondly, you could use a formula. And lastly, you could use a Goal Seek. That's pretty much the webinar for today, I will hand back over to Swati, just a second.

Swati: Hello, we have got a couple of questions from our listeners today, from our webinar attendees. I will ask Danielle to go through them and we will answer the questions one by one. So she has a question from... She will answer the question and we will take up the names as well, if possible.

Danielle: Firstly, we have got a question from Abdullah. He's asked where he can find the materials for the webinar. That's probably the easiest one, we will email it out to you. The slides are going to go onto SlideShare, we will try the Excel file that I have showed you, we will try to get that onto SlideShare as well and we will email it all out to you. So, if you have registered for the webinar and we've got your email address, we will be able to email that out for you.

Now, Paul has got a question about, "How do you plan version-control so you are always using the latest version?" I presume you mean in terms of the version of the Excel file, so, if somebody

makes a change to the Excel file and you don't know what sort of version—which version—that's probably something that Excel does not do very well. It's probably a major problem with using Excel, its version control. Part of financial modelling version control is to keep doing changes and saving a copy of the file so that you know when it was changed and know about ideas about having a version control sheet at the very front of the document and show what was changed and when, but, yes, I do agree that that can be quite a problem.

Dinesha's asked a question about books that can be purchased from Amazon, there are lots and lots of books that are available on Amazon. You can get a copy of my book which is *Using Excel for Business Analysis*, you can buy that from Amazon. If you come to my course here in Dubai, you get a copy of my book which is included in the course fee—the course materials. There's a new book coming out later this year, so there will be another edition coming out. So there will be a lot of books available. I don't know any books that are specifically on break-even because it's a fairly small topic, a subset of financial modelling and finance studies but it is covered by a lot of financial modelling and finance books.

Yes, Abdullah has another question about Macros. "Can you make a macro from the Goal Seek if possible?" Have we got time for that, I am not sure. Yeah, I will have a go, let's see if we can get that working. Do we have any other questions before I do that? Okay.

Dinesha's asked a question about the Goal Seek, she would like me to go over the question one more time. So, why don't we do that? I am just going to go back over to the screen here, let's go back to this example here. What we have done to create a Goal Seek, to do a Macro, okay, I haven't prepared for this but I will have a go at it. If I am going to record a Macro, what I am going to do is to install—I don't have the develop tab here at the top—what I need to do is to go into, go into Popular Commands, go to Customize Ribbon and add a Developer tab, it's a good idea to install the tab. I only need—I am not in my laptop, so, I just had to install that—I have got the Developer tab. I only have to do that once.

I am going to go now and record a Macro. So, if I hit Record, let's see, we can get this to work. Let's just call this a Goal Seek. So, if we record ourselves creating a Goal Seek, let's go in to Data here, Goal Seek and set that cell to zero By Changing the input variable and now that we have done that, we will stop recording. Let's see if that works. I do find that sometimes, you need to use a name range for this, sometimes it does work without using a name range sometimes it doesn't, we will how it goes.

We are going in here (Shapes) and create a button but I am going to do this quickly. But if you have signed up for the webinar, you will get a recording of it. So, you will be able to watch this again. Run Goal Seek and you can make it a bit smaller. You can change the colour of it and make

it look a little bit more interesting. Write Run Goal Seek. And then right hand click and Assign Macro. And so we can assign the run Goal Seek Macro like that. Let's see if this going to work. Let's put this back to 3,000 and run the Goal Seek, there it's worked. So, you know, if we change the raw materials, we change it to 6 and run the Goal Seek, so you can see here what I did what just hit Record, run the Goal Seek, and stop recording. What that does it just records myself creating the Goal Seek, so every time I hit that button, it's going to run the Goal Seek.

I am going to go into Edit and you can see the code that's changes. Sometimes, I do find that it can be a little bit temperamental, if you find that it doesn't work, you may find that instead of using that range of C16, you may find that using a name range can be a little bit more robust every now and then rather than using a relative reference that I have got there.

There we go, let's just go through that one more time. What I did there was to record the Macro, record myself doing the Goal, and create the Macro button, right hand click on the button and then Assign Macro. And then every time I hit the button, it's going to run the Goal Seek.

Dinesha has a question, "Do you any specific book on Excel Macros alone?" I am sure there are lots of books on Macros, personally I don't use Macros an awful lot. I do find that I try to keep my financial models as simple as possible. And try to make it so other people can understand very easily. Macros can be quite difficult for other people to take apart and edit and make changes to, if I can do without a Macro, I would prefer to. Creating a macro, that's very useful though. I do use a Macro for the Goal Seek but the book that I have written does have a section on Macro, but it's not a huge part of the book. But there certainly are books with specifically on VBA or Visual Basic for Excel. Make sure to get a finance book, you can get one. There are some visual basics is a huge topic, so, make sure it's not just on visual basics and all sort of other things.

Abdullah has a question about macros being used in multiple Excel sheets. Absolutely. A macro can do anything, if you do it in Excel, you can record it with a macros. Macros can do all sorts of different things.

"What if we added another line?" Great question. Muhammad has a question about Macros, that's a really good point actually. There are macros that I have recorded there, I have set it to be specifically change the value that was within of C11. Now, if you insert a next row, C11 will not be C11 anymore, it will be C12 or something else. So, that's one of the problems of using macros. That's why using a name range would perhaps be a more robust way of building that macros.

Prabin says, as I know from other classes that he is done with me; "We should avoid macros as much as possible, right?" I would not go so far as to say avoid Macros completely, they can be useful. But certainly, if you can do it without a macro, I would do it. If you could do it using a

formula, go for that option, as I always say, try to keep your financial model **as simple as possible but it is as complex as necessary**. So, we do it as simply as we can, if it does not perform what you need to do, then you might have to go for more complex solutions. That may include a macro.

Abdullah says, “Can we make a restriction except for the cell that requires updating?” Yes, you can certainly use Protection so if you go into the Properties of the cell, why don’t I just show you how to do that, actually. I am just going to go back to the file here, and let’s say here I want people to be able to change the number of units but I don’t want them to change anything else. So, what I am going to do here is right hand click on that particular cell, go to Format Cells, go to Protection and Unlock it. So, that’s unlocking that particular cell. Then I can go to Review and Protect Sheet. I can put a password or I could save without a password. I will say OK. So, if I am trying to change one of these formulas, it will not let me. But, if I am trying to change this, it will allow me to do that. And that’s not a bad idea when you have got this kind of a model set up. Because you really don’t want people to play around with your formulas. You only want them to edit certain cells within that you want them to change.

Just one other question. Sarah’s asked, “Can you recommend a book for financial modelling for beginners?” There are lots of books, I wrote the books *Financial Modelling Fundamentals*, I suppose it is for people who are fairly new to financial modelling. It does cover some more advanced things in it but there’s a lot of business practise in there. I would say it’s for beginners. There’s probably a couple of other books as well.

We have a comment from Carl. He says that using Macro VBA modelling for repetitive actions such as Goal Seek but that’s out of Excel, it’s a completely different universe, yes absolutely. Really, it is just a massive subject all in itself. And that’s why I only touch on it. It’s certainly just a very useful skill to have. But it’s really easy to get sucked in and to get very technical with it. So, you know, it’s good to know a little bit of VBA certainly.

If there aren’t any other question we might wrap that up. Okay. Thank you very much for having me. You will be hearing from us. We will send out the—the slides will be going on to SlideShare and we will certainly send out the Excel files so you can play around with that as well. And the recording of this whole webinar will be available on YouTube as well. So, look out for that. Look forward to seeing you again in the future. Thanks very much. Bye!