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# EDITED BRIEF

AMD.OQ - Q4 2022 Advanced Micro Devices Inc Earnings Call

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**OVERVIEW:**

Co. reported 4Q22 revenue of \$5.6b, net income of \$1.1b and diluted EPS of \$0.69.  
Expects 1Q23 revenue to be approx. \$5.3b plus or minus \$300m.

## CORPORATE PARTICIPANTS

**Jean X. Hu** *Advanced Micro Devices, Inc. - Executive VP & CFO*

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## CONFERENCE CALL PARTICIPANTS

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**Vivek Arya** *BofA Securities, Research Division - MD in Equity Research & Research Analyst*

## OVERVIEW

Co. reported 4Q22 revenue of \$5.6b, net income of \$1.1b and diluted EPS of \$0.69. Expects 1Q23 revenue to be approx. \$5.3b plus or minus \$300m.

## FINANCIAL DATA

- A. 2022 revenue = \$23.6b.
- B. 4Q22 revenue = \$5.6b.
- C. 2022 net income = \$5.5b.
- D. 4Q22 net income = \$1.1b.
- E. 2022 diluted EPS = \$3.50.
- F. 4Q22 diluted EPS = \$0.69.
- G. 2022 YoverY revenue growth = 44%.
- H. 4Q22 YoverY revenue growth = 16%.
- I. 2022 GM = 52%.
- J. 4Q22 GM = 51%.

- K. 4Q22 OpEx = \$1.6b.
- L. 4Q22-end inventory = \$3.8b.
- M. 4Q22-end cash, cash equivalents and short-term investment = \$5.9b.
- N. 1Q23 revenue guidance = approx. \$5.3b plus or minus \$300m.

## PRESENTATION SUMMARY

### I. ANNOTATION (R.C.)

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**A. Note:**

- 1. Will refer primarily to non-GAAP financial measures.

**B. Upcoming Events:**

- 1. Mark Papermaster, Chief Technology Officer and Executive Vice President Technology and Engineering will attend Morgan Stanley Technology Media and Telecom Conference on 03/06/23.
- 2. 1Q23 quiet time is expected to begin at the close of business on 03/17/23.

### II. 2022 REVIEW (L.S.)

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**A. CFO Transition:**

- 1. Devinder Kumar steps down as CFO.
- 2. Jean Hu appointed as new EVP and CFO.
  - a. Has more than 14 years of public co. CFO experience and proven track record of financial leadership.

**B. Highlights:**

- 1. 2022 was a strong year for AMD as it navigated the challenging macro-environment to deliver best in class growth and record profitability driven by embedded and datacenter segments.
- 2. Transformed the Co.
  - a. Accelerated datacenter business and closed strategic acquisitions of Xilinx and Pensando, significantly diversifying Co.'s business and strengthening its financial model.
- 3. Data Center Embedded Product sales grew from \$3.9b in 2021 to \$10.6b in 2022.

**C. Results:**

- 1. 4Q22 revenue increased 16% YoverY to \$5.6b, driven by significant growth in Embedded and Data Center segments, which accounted for more than 50% of overall revenue.
- 2. Full-year annual revenue grew 44% to \$23.6b.
- 3. Set annual records for revenue, GM and profitability, driven largely by 64% increase in Data Center segment revenue and the strong performance of Embedded segment following Xilinx Acquisition.
- 4. Data Center:
  - a. Revenue increased 42% YoverY to \$1.7b, led by increased adoption of EPYC processors by cloud providers.
- 5. Cloud:
  - a. Sales to North American hyperscalers more than doubled YoverY as hyperscale customers continued moving more of their internal workloads and external instances to EPYC processors.
  - b. EPYC processors now power more than 600 publicly available instances globally following launches of new AMD-based instances from AWS, Microsoft and others.
- 6. Enterprise:

- a. Revenue declined YoverY as demand slowed based on the macro-environment.
- i. Against this backdrop, Co. continues expanding its pipeline and closed a number of new wins with Fortune 500 financial services, automotive, technology, energy and aerospace companies.

**D. HPC:**

1. Growing EPYC Processor adoption was highlighted by the number of AMD-powered supercomputers on the latest Top 500 list, increasing by 38% YoverY.
2. AMD now powers more than 100 of the world's fastest supercomputers and 15 of the Top 20 most energy-efficient supercomputers in the world.
3. To build datacenter leadership, Co. launched its fourth Gen EPYC processors this past Nov. that deliver up to 2 times faster performance in cloud, enterprise and HPC applications, and are up to 80% more energy-efficient than the competition's most recently announced offerings.
4. Seeing very strong customer pull for Fourth Gen EPYC CPUs which complement Third Gen offerings with additional performance and capabilities.
5. Initial cloud deployments are going very well and Co. expects to ramp both internal workloads and public instances throughout 2023.

**E. Enterprise:**

1. There are more than 140 Fourth Gen EPYC platforms in development from HPE, Dell, Lenovo, Super Micro and others.
  - a. An increase of 40% vs. prior generation.

**F. Broader Data Center Portfolio:**

1. Had record sales of Xilinx datacenter and networking products, led by strong demand from financial services companies for newly-launched Alveo X3 series boards optimized for low-latency trading.
2. Sales of Pensando DPUs also ramped significantly from prior qtr., driven by supply chain improvements and continued demand.
3. Co. is very pleased with customer reception of Pensando technology with good long-term growth opportunities as DPUs become a standard component in next-generation of cloud and enterprise datacenters.
4. GPU sales were down significantly YoverY when Co. had shipments supporting the build-out of multiple instinct MI250 accelerators supercomputer wins.
5. In Jan., Co. previewed next-generation MI300 accelerator that will be used for large model AI applications in cloud datacenters and has been selected to power the two-plus Exaflop El Capitan Exascale supercomputer at Lawrence Livermore National Laboratories.
  - a. MI300 will be industry's first datacenter chip that combines CPU, GPU and memory into a single integrated design, delivering eight times more performance and five times better efficiency for HPC and AI workloads vs. MI250 accelerator currently powering the world's fastest supercomputer.
  - b. MI300 is on-track to begin sampling to lead customers later this qtr. and launch in 2H23.

**G. Client Segment:**

1. Revenue declined 51% YoverY to \$903m.
2. Continues to ship below PC consumption in 4Q22 as Co. focused on further reducing downstream inventory.
3. While overall PC demand remains soft, desktop channel sell-through increased sequentially during the holiday season.
4. Launched latest generation Ryzen 7,000 Series notebook processors earlier in Jan., including Ryzen 7040 CPU series that deliver leadership performance in battery life and are AMD's first processors to feature Ryzen AI, industry's only dedicated on-chip AI inference engine in an x86 processor.
  - a. Ryzen AI is powered by highly scalable ex D&A architecture, which is the first integration of AMD and Xilinx IP, less than a year after closing the acquisition.
5. Launched Ryzen 7045 Series CPUs.
  - a. Co.'s first mobile processor is based on triplet design that delivers significantly higher performance and the competition in gaming and content creation applications.

- b. Has more than 250 ultrathin gaming and commercial notebook design wins spanning Co.'s full family of Ryzen 7,000 Series processors on track to launch this year, up 25% YoverY with first notebooks plan to go on sale in Feb.

#### H. Gaming Segment:

1. Revenue declined 7% YoverY to \$1.6b as lower gaming graphics sales more than offset higher semi-custom revenue.
2. Semi-custom SoC revenue grew YoverY as demand for game consoles remained strong during the holidays.
3. Gaming graphics revenue declined YoverY as Co. further reduced desktop GPU downstream channel inventory.
4. Channel sell-through of Radeon RX GPUs increased sequentially.
5. Launched high-end Radeon 7900 series GPUs to strong demand based on the performance of new RDNA 3 architecture and five nanometer triplet design.
6. In Jan., Co. announced its first RDNA 3 mobile GPUs that have been selected to power new gaming notebooks from Dell Alienware, ASUS and others that are on-track to begin shipping in the 1H23.

#### I. Embedded segment:

1. Revenue increased significantly YoverY to a record \$1.4b.
2. Had record sales across a number of Embedded markets, including communications, automotive, industrial and healthcare, aerospace and defense and test and emulation.
3. In communications, Co. saw particular strength with expanded 5G wireless installations in India and ongoing wired infrastructure deployments with Tier-one communications providers. Automotive growth was driven by the ramps of new forward camera, 4D Radar and infotainment wins across multiple customers.
4. Co. recently announced multiple new wins for automotive grade zinc UltraScale Plus platforms with some of the largest vehicle equipment suppliers, including Aisin's next-generation automated parking assist system and DENSO's next-generation LiDAR platform that can improve the resolution required for autonomous driving and other industrial machine vision applications by 20 times.
  - a. Continues to see strong growth with industrial and healthcare, aerospace and defense, and test and emulation customers, driven by SAM expansion for Co.'s leadership adaptive SOCs, new design win ramps and increased supply across multiple nodes.
5. As Co. approaches the one year anniversary of the closing of its Xilinx Acquisition next month, the integration has gone extremely well and Embedded business has become a major growth driver for AMD, strengthening financial model and significantly diversifying its business.
  - a. Seeing substantial new revenue synergy opportunities as Co. combines Xilinx's industry-leading adaptive products and 6000-plus customers with AMD's expanded breadth of compute products and scale.

#### J. Summary:

1. Overall, 2022 was a strong year for AMD despite weak PC market.
2. Significantly grew Data Center Embedded and gaming businesses and executed well across product portfolio.
  - a. As it enters 2023, Co. expects overall demand environment to remain mixed with 2H23 stronger than 1H23.
3. In the PC market, Co. is planning for the PC TAM to be down approx. 10% for 2023.
  - a. Expects to continue to ship below consumption in 1Q23 to reduce downstream inventory which is reflected in guidance.
4. In Embedded and Data Center segments, Co. believes it is well-positioned to grow revenue and gain share in 2023 based on the strength of its competitive positioning and leadership high-performance and adaptive product portfolio.
  - a. Co. does see elevated levels of inventory with some cloud customers which will lead to softer 1H23 and stronger 2H23.
5. Continues working very closely with customers to navigate the dynamic market conditions, while also making the right strategic investments to exit the current cycle with an even stronger and more differentiated set of products to drive future growth.
6. Over the next several years, one of Co.'s largest growth opportunities is in AI, which is in the early stages of transforming virtually every industry service and product.
  - a. Expects AI adoption will accelerate significantly over the coming years.
7. Incredibly excited about leveraging Co.'s broad portfolio of CPUs, GPUs and adaptive accelerators in combination with its software expertise to deliver differentiated solutions that can address the full spectrum of AI needs in training and inference across cloud, edge, and client.

### III. 2022 FINANCIALS (J.H.)

#### A. Highlights:

1. 2022 was a very strong year for AMD.
  - a. Record revenue, GM, profitability and Co. generated significant free-cash flow.
2. The year was also highlighted by Co.'s strategic acquisitions of Xilinx and Pensando, expanding and diversifying business portfolio.

#### B. 4Q22 Results:

1. Revenue \$5.6b.
  - a. Up 16% YoverY, driven by higher revenue in Embedded and Data Center segment, partially offset by lower Client and Gaming segment revenue.
2. GM was 51%.
  - a. Up 70 BP YoverY, primarily driven by richer product mix with higher revenue in the Embedded and Data Center segments, partially offset by lower Client segment revenue.
3. OpEx \$1.6b vs. \$1.1b a year ago, driven by the inclusion of Xilinx OpEx and additional R&D and the go-to-market investments to support the next phase of revenue growth.
4. Operating income declined \$66m YoverY to \$1.3b.
5. Operating margin 23%.
  - a. Down 27% YoverY.
6. Net income \$1.1b flat YoverY.
7. Diluted EPS \$0.69 vs. \$0.92 a year ago, primarily due to lower Client operating income.

#### C. Data Center:

1. Revenue \$1.7b.
  - a. Up 42% YoverY, primarily driven by strong growth in third generation EPYC server processor revenue and the early ramp of fourth generation EPYC processors.
2. Operating income \$444m or 27% of revenue vs. \$369m or 32% a year ago.
  - a. Higher operating income was driven primarily by stronger revenue, partially offset by higher R&D investment to support the topline revenue growth.

#### D. Client:

1. Revenue \$903m.
  - a. Down 51% YoverY due to reduced processor shipments resulting from weak PC market and significant inventory correction across the PC supply-chain.
2. Operating loss \$152m vs. \$530m a year ago or 29% of revenue, primarily due to lower revenue.

#### E. Gaming:

1. Revenue \$1.6b.
  - a. Down 7% YoverY due to lower gaming graphics revenue, partially offset by higher semi-custom product sales.
2. Operating income \$266m or 16% of revenue vs. \$407m or 23% a year ago.
  - a. Decrease was primarily due to lower graphics revenue.

#### F. Embedded:

1. Revenue \$1.4b.
  - a. Up \$1.3b YoverY, primarily due to the inclusion of Xilinx embedded revenue.
2. Operating income \$699m or 50% of revenue vs. \$18m or 25% a year ago, primarily driven by inclusion of Xilinx.

#### G. Balance Sheet:

1. Has strong balance sheet.
2. 4Q22-end cash, cash equivalents and short-term investment \$5.9b.

3. Returned \$250m to shareholders through share repurchases.
  - a. In 2022, Co. returned a total for \$3.7b to shareholders, which was 119% of free cash flow.
  - b. Has \$6.5b in remaining authorization to share repurchases.
4. Free cash flow was \$443m vs. \$736m in 4Q21.
  - a. Decrease was primarily due to higher inventory.
5. Inventory \$3.8b.
  - a. Up approx. \$402m from prior qtr., primarily driven by the inventory increase in advanced process nodes to support the ramp of new products.

#### H. Full-Year Results:

1. Revenue \$23.6b.
  - a. Up 44% YoverY, driven by increased Embedded, datacenter and gaming segment revenue, partially offset by lower Client segment revenue.
2. Combined AMD and Xilinx co. basis, 2022 pro-forma revenue was \$24.1b.
  - a. Up 20% vs. \$20.1b in 2021.
3. GM 52%.
  - a. Up 370 BP YoverY, primarily driven by richer product mix with higher revenue from Embedded and Data Center segment, partially offset by lower Client segment revenue.
4. OpEx 26% of revenue vs. 24% in 2021.
5. Operating income \$6.3b.
  - a. Up \$2.3b or 56% from year ago.
6. Operating margin of 27% vs. 25% in 2021, primarily driven by higher revenue and GM expansion.
7. Net income \$5.5b vs. \$3.4b, up 60% YoverY.
8. EPS \$3.50 vs. \$2.79 for prior year, primarily due to datacenter growth and addition of Xilinx.
9. Free cash flow \$3.1b.
  - a. Free cash flow margin 13%.
10. Invested approx. \$1b in long-term supply chain capacity in 2022 to support expectations for future revenue growth and increase market share.

#### I. 1Q23 Outlook:

1. Note:
  - a. Outlook is based on current expectations and contemplates the current macro-environment.
2. Revenue to be approx. \$5.3b plus or minus \$300m.
  - a. Decrease of approx. 10% YoverY and 5% sequentially.
3. YoverY Data Center and Embedded segment revenue are expected to grow, offset by lower Client and Gaming segment revenue.
  - a. Sequentially, Embedded segment revenue to increase.
4. Client and Gaming segment revenue to decline largely consistent with seasonality. Data Center segment revenue to decline due to elevated levels of inventory with some cloud customers.
5. Non-GAAP GM to be approx. 50%.
6. Non-GAAP OpEx to be approx. \$1.6b.
7. Non-GAAP interest expense, taxes and other to be approx. \$146m based on 13% effective tax rate.
8. Diluted share count to be approx. 1.62b shares.

#### J. Full-Year 2023 Guidance:

1. Co. is not providing specific guidance due to uncertainty in macro-environment.
2. Embedded and Data Center annual revenue to grow from 2022 based on the strength of Co.'s product portfolio and expected share gains.
3. Client and Gaming segment revenue to decline based on current demand environment. Non-GAAP GM to be approx. flattish in 1H23 and expansion in 2H23.
4. Expects to manage quarterly non-GAAP OpEx flat with [1Q23] until Co. sees the demand environment improves.



5. For modeling purpose, Co. expects non-GAAP effective tax rate to be 13%.
6. Diluted share count to be approx. 1.62b shares.

**K. Summary:**

1. Had a strong year with record revenue and profitability, driven by leadership of product portfolio and the diversification of Co.'s business.
2. Looking forward into 2023, Co. will continue to focus on executing long-term growth strategy while driving financial discipline and operational excellence.
3. Believes leadership of products, growing customer momentum and strong financial foundation positions Co. well for long-term profitable growth.

## QUESTIONS AND ANSWERS

### Operator

(Operator Instructions) Our first question today is coming from Matt Ramsay from Cowen.

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**Matthew D. Ramsay** - *Cowen and Company, LLC, Research Division - MD & Senior Research Analyst*

Yes. First of all, congratulations, Jean. And congrats as well to Devinder. I mean the last 5 years of the company have been remarkable, but I remember all the work you and your finance team did 6 or 7 years ago to keep the foundation stable for what's happened since. So enjoy the retirement.

My first question, Lisa, is just about the drivers of 2023. You guys talked in the prepared script about all the different crosscurrents that are kind of going on right now versus the strength of your portfolio versus some inventory digestion in the Data Center space and obviously, what's going on in the PC market. But I've gotten about a zillion versions of the same question tonight, which was do you think the company can grow for the year 2023 overall? And if you could just kind of walk us through the drivers of the business as we work through the year.

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**Lisa Su** - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Yes, absolutely, Matt. Thanks for the question. So there are lots of puts and takes in 2023, and we want to give you kind of some of the drivers. Our largest growth driver is certainly the Data Center. We are very positioned well with our product portfolio. We just launched our Genoa 4th Gen EPYC. We also have Bergamo coming this year as well.

When we talk to our cloud customers, what they're telling us is they appreciate the execution of our road map. And we have an opportunity to move more workloads to AMD as we go through the year. So we feel very good about our product positioning.

As we mentioned in the prepared remarks, coming off of a very strong 2022, there is some inventory at some of the cloud customers. And so we are expecting a softer first half and then a stronger second half, but we feel very good about our market share position and opportunity to grow with Data Center. Also on the Embedded side, I would say we have a very strong portfolio there. The Xilinx business has done very well in 2022. It's a diversified set of markets. We see strength in a number of the end markets. And so we think that's also a grower for AMD.

On the other side, our Client and Gaming businesses, we believe, will decline. We have made good progress. When we look at the PC markets in the second half of the year of 2022, we were really trying to rebalance inventory, and I think we made progress exiting Q4. We're still expecting to ship below consumption in the first quarter and then sort of go from there. Our product portfolio is



strong. We think there's an opportunity for growth as we go into the second half of the year. But we think overall for the year, client will decline just given the TAM.

And then on the Gaming segment, again, we're coming off of a very strong 2022. And so console demand has been actually quite strong. And given where we are in the cycle, we would expect gaming to be down on a year-over-year basis. But overall, I think lots of puts and takes, but we're positive on what we can do in terms of the Data Center and the Embedded segments, given our product portfolio. And we'll watch the macro on the Client and Gaming and see how that plays out.

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**Matthew D. Ramsay** - Cowen and Company, LLC, Research Division - MD & Senior Research Analyst

I guess as my follow-up, I wanted to ask a question about gross margin. The margin, I guess, sequentially down a little bit into March. But I kind of wanted to focus on the drivers of the longer-term margin that's down, I guess, 3 or 4 points from where you were a few quarters ago despite more mix of the revenue coming from Embedded and Data Center. So if there's any way that you guys could try to quantify maybe how much of the margin headwind is from just lower client revenue. How much of it might be from any programs that you're working through to clear the channel? And how might we model? What are the drivers that we should think about in terms of the margin recovering?

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**Lisa Su** - Advanced Micro Devices, Inc. - President, CEO & Chair of the Board

Yes. Maybe -- so on the overall margin, the way to think about our business, Matt, is -- and our margin is primarily driven by product mix. So as the Embedded and Data Center businesses are -- grow, so the margin expansion grows with it. In terms of the sequential question that you had from Q4 to Q1, that's just a product of the mix. So with Data Center being lower sequentially, that's that. We are also working through our client inventory clearing. What we're seeing in the PC business is, as we're going through this sort of normalization of inventory, especially on some of the older products, we do have more marketing programs and pricing incentives in place. We do expect that to normalize as we go through the first half of the year. And so as Jean said in the prepared remarks, we would expect margin expansion as we go into the second half with the growth in Data Center, Embedded and some normalization of the client business as well.

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**Operator**

Your next question is coming from Vivek Arya from Bank of America Securities.

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**Vivek Arya** - BofA Securities, Research Division - MD in Equity Research & Research Analyst

Best wishes to Devinder and Jean from my side as well. On the first one, Lisa, I think you mentioned some elevated inventory among your cloud customers. I was hoping you could give us some quantification of how elevated. Is it a 1-quarter issue? Is it a 2-quarter issue? Does it impact the pace of your January ramp? Because I think coming into this year, the expectations where you could grow server sales by over 20%, do you think that is still a possibility because I imagine you get some benefit from better general pricing. So just puts and takes of how we should think about your Data Center business through this year.

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**Lisa Su** - Advanced Micro Devices, Inc. - President, CEO & Chair of the Board

Yes, sure, Vivek. So look, we remain very bullish about our Data Center business. I mean I think the feedback that we've gotten on Genoa from our customer set is very strong. And as I said, the important thing is we are expanding workloads.

In terms of where we believe the -- as the inventory normalizes, each customer is different, so they have what they're trying to achieve in terms of inventory levels. Our expectation is that sort of the first half softness for cloud and then second half strength as that's worked through. But like I said, it's different for each customer.

And then in terms of overall growth, as I said, we're very bullish on the overall growth of our Data Center business and the opportunity to gain share as we go through the year. And as we go through the ramp in Genoa, we do have more content with the higher core count that should also help ASPs.

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**Vivek Arya** - BofA Securities, Research Division - MD in Equity Research & Research Analyst

Got it. And then on the PC side and also kind of as it relates to the pricing environment, you mentioned the PC TAM is -- could be down about 10%. But when we look at the shipments, right, from you and your competitor, they could be down as much as 40% or 50%, right, year-on-year in Q1. So do you think there's a possibility that the TAM assumption of just down 10% could be an optimistic one?

Because I would imagine that would suggest the inventory clears out soon, but you're suggesting that it may not clear out until Q2. So I was just hoping you could give us some better sense for when the PC market starts recovering. And do you think it could become more price competitive before it recovers?

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**Lisa Su** - Advanced Micro Devices, Inc. - President, CEO & Chair of the Board

Yes. So maybe just to make sure that we're just correlating the numbers. So my comment about PC TAM being down 10% was assuming if you take a look at sort of what IDC just published for 2022 at about 290 million units, and that's more of a sell-through TAM versus a sell-in TAM. So we have been under-shipping sort of the sell-through or consumption for the last 2 quarters in an attempt to renormalize that as soon as possible.

In terms of do I think it's -- I think it's in the ZIP code. I think it's in the ZIP code. So if you imagine 2023 sell-through TAM of about 260 million units, plus or minus, seems to be about the right number. We have made good progress in inventory normalization. We want to be cautious, obviously, heading into the year just given the macro environment. First quarter we said would be roughly seasonal for PCs. I think second quarter -- first quarter should be the bottom for us in PCs. We -- and then grow from there into the second quarter and then into the second half.

And I should note also, Vivek, I mean, we just launched our Ryzen 7000 series with sort of our AI capabilities, both from a notebook and desktop standpoint. So we feel good about the product road map in PCs. Obviously, we have to get through this normalization. Most of the focus is on continuing to differentiate our products and working with our customers to offer sort of very strong platforms.

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**Operator**

Next question is coming from Stacy Rasgon from Bernstein Research.

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**Stacy Aaron Rasgon** - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

I noted that you said that gross margins would expand in the second half, but you didn't give us any color on how much they might expand. Can you give us any idea like first half to second half? Or I mean just for the full year, do you think gross margins grow year-over-year from the 52% that you printed in 2022?

**Jean X. Hu** - Advanced Micro Devices, Inc. - Executive VP & CFO

Stacy, this is Jean. Let me take this question, then Lisa can add. As we talk about it, it's both our Embedded and Data Center segment have strong gross margins. So we feel pretty good about second half.

We continue to have the growth of both Embedded and Data Center segment. The major headwind we are facing is really Client side, which if you think about the gross margin in the first half of 2022 versus the first half of 2023, the major impact is from the client revenue, inventory correction, which impact the gross margin in the Client segment.

So going into second half, the normalization of the Client segment will help us to expand the gross margin. I think it really depends on how the Client segment will recover. That will drive the gross margin if it's going to go back to the first half of 2022 or expand beyond that level. But overall, we feel pretty good. Once we normalize the Client segment, our gross margin will continue to expand.

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**Stacy Aaron Rasgon** - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

So I guess I'd ask the question again, for 2023, do you think gross margins can expand over 2022?

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**Lisa Su** - Advanced Micro Devices, Inc. - President, CEO & Chair of the Board

Maybe what I would say, Stacy, is I think we've given you the puts and takes for where the margin goes. I think it depends a bit on what happens in the macro environment. But we do feel good about second half expansion, and we'll see sort of the relative recovery in macro as it relates to all of our segments.

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**Stacy Aaron Rasgon** - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. I guess for my follow-up, maybe it follows up on that a little bit more just around the mix. I get how Data Center and Embedded should be growing in the second half versus the first half. But presumably, Client will, too, first half to second half, given that you are under-shipping, it sounds like by a pretty wide margin right now. How do you feel about your mix just across the 4 businesses of the second half versus the first half?

Do you think your Data Center plus Embedded mix, as a percentage of total revenue in the second half, is materially higher than it is in the first half? Or I mean could it even be not that different at all given the potential growth that you might see just from the channel normalization in clients?

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**Lisa Su** - Advanced Micro Devices, Inc. - President, CEO & Chair of the Board

Yes. I think the way to think about it is, I think our Data Center grow -- growth in the second half versus first half, we expect that to be significantly stronger. As it relates to clients, we would also expect it to be stronger. Again, depending a bit on macro and sort of how the TAM actually evolves. I think for the Embedded businesses, I would say that we expect to grow over the full year 2023 versus 2022. What we see right now is a fairly strong backlog and good visibility into the first half of the year. I'm not ready to say that Embedded will grow in the second half versus the first half, though, because we're coming off very strong growth already. And so I think those are the puts and takes.

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**Operator**

Next question is coming from Toshiya Hari from Goldman Sachs.

**Toshiya Hari** - *Goldman Sachs Group, Inc., Research Division - MD*

Lisa, the pushback that we often get is AMD is doing really well, gaining share, but you're gaining share in relatively mature markets. And when it comes to AI, you do have a strategy, but you really haven't shown the product set, if you will. You talked about how you have CPU, GPU, FPGA and Pensando, and you're shipping samples of MI300, I guess, later this quarter and potentially launching in the second half. At what point do we, as analysts and investors, start to see your AI strategy materialize in the P&L and your profitability, if you will?

**Lisa Su** - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Yes. Thanks for the question. We believe that AI is a huge driver of compute growth. And given our portfolio, it should be a driver of our growth as well. I think if you think about the product sets that we are putting sort of AI content in, you should expect MI300, of course, on the GPU training side. We just launched Ryzen AI in our PC portfolio. You can expect additional AI acceleration coming in our server portfolio as well. So you're going to see AI broadly across our road maps.

In terms of when -- we've talked before about sort of our Data Center GPU ambitions and the opportunity there, we see it as a large opportunity. As we go into the second half of the year and launch MI300, sort of the first user of MI300 will be the supercomputers or El Capitan, but we're working closely with some large cloud vendors as well to qualify MI300 in AI workloads. And we should expect that to be more of a meaningful contributor in 2024. So lots of focus on just a huge opportunity, lots of investments in software as well to bring the ecosystem with us.

**Toshiya Hari** - *Goldman Sachs Group, Inc., Research Division - MD*

That's very helpful. And then, Lisa, as my follow-up, I had a question on profitability in your client business or your PC business. I think a year ago, margins were really high. Supply was relatively tight. Since then, with the inventory correction and perhaps a little bit more competition, your profit margins are down. You talked about the first half of this year still being sort of in digestion mode, and then in the second half, things normalizing. But would it be realistic to assume your gross margins in the Client business return to first half '22 levels? Or in hindsight, margins back then were perhaps you were over-earning in that business given the environment?

**Lisa Su** - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Yes. Sure. So I think on the Client segment, it's fair to say that we believe, given where we are with the client inventory levels, the first half will certainly be lower. We expect some improvement in the second half. But in terms of overall margin, we expect that the client business will be below the corporate average, and that's how we're modeling the client business.

**Operator**

Next question is coming from Aaron Rakers from Wells Fargo.

**Aaron Christopher Rakers** - *Wells Fargo Securities, LLC, Research Division - MD of IT Hardware & Networking Equipment and Senior Equity Analyst*

Yes. I guess the first question is going back to the Data Center piece of the business and specifically around the ramp of Genoa. I'm curious, is there any help that you can provide us with thinking about the ASP uplift you expect to see with the Genoa product cycle? And I guess at some point through 2023, how do we start to think about the Bergamo product cycle as well impacting the server CPU business?

**Lisa Su** - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Sure. So Aaron, we started shipping Genoa in the third quarter that ramped into the fourth quarter and will continue to ramp through 2024. The way I think about -- or the way you should think about the Genoa ramp is that it is a new platform for our customers. So they'll be introducing it -- introducing first-in-cloud sort of internal workloads and then going to external workloads and then enterprise. So I think it will be throughout 2024. We have -- I'm sorry, throughout 2023.

We do have higher core counts on Genoa. So you would expect that, that will give us some ASP uplift as we go through to some of those higher core count products. Bergamo will launch in the first half of the year. We are on track for the Bergamo launch, and you'll see that become a larger contributor in the second half. So as we think about the Zen 4 ramp and the crossover to our Zen 3 ramp, it should be towards the end of the year, sort of in the fourth quarter, that you would see a crossover of sort of Zen 4 versus Zen 3, if that helps you.

**Aaron Christopher Rakers** - *Wells Fargo Securities, LLC, Research Division - MD of IT Hardware & Networking Equipment and Senior Equity Analyst*

Yes, that's very helpful. And then as a quick follow-up, the business doesn't really ask that much about, but it's been doing phenomenally well here these last couple of quarters. It's actually the Xilinx business. I know it's within the Embedded largely. But your self reporting, I think if I read the filings correctly, growing 40% plus on a like-for-like basis for Xilinx. I think your competitor also growing a solid pace. How do you think about the sustainability or durability of that demand in that Embedded or Xilinx business as we move through '23?

**Lisa Su** - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Sure. So Aaron, that business has done very well. So the Xilinx business, I think our overall Embedded business continues to do well. When we look across the subsegments, there are puts and takes in the subsegments. But what we see is content is going up. So we had records in communications, industrial and health care, aerospace and defense, automotive. We have the Embedded processor content that's also going into automotive. So we feel very good about that business.

I think as we look into 2023, I mentioned this in the question with Stacy, we have a very good visibility to the first half just given the lead times and the backlog. And the first half looks strong, so we expect to grow sequentially in the first quarter. As we go into the second half of the year, we're monitoring the overall demand environment. And just given how strong it's been, we are looking at whether there'll be some puts and takes in some of the end market segments there. But overall, I think the key point is the content, and our design win momentum is good, and we continue to ramp new design wins in the Xilinx business.

**Operator**

Your next question is coming from Joe Moore from Morgan Stanley.

**Joseph Lawrence Moore** - *Morgan Stanley, Research Division - Executive Director*

I wonder if you could talk to us about the puts and takes of PC market share in a down 10% environment. I would assume it helps you with consumers better than commercial, but what is your progress in terms of penetrating the notebook market and penetrating the commercial market where you could continue to gain share?

**Lisa Su** - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Yes. Joe, we view that the opportunity -- so first of all, I would say that in general, the PC market share numbers are probably a bit noisy right now, just given all of the sell-in, sell-through and the inventory dynamics that are being worked through. Actually, in the fourth quarter, we believe we gained a little bit of share in the PC market. As we go forward into 2023, we think our product portfolio is very strong. As we look at Ryzen 7000 and where it goes and where we are positioned in the commercial as well as the high-end consumer segments, we're not changing our strategy on PCs. Quite -- a few years ago, we really focused on sort of the more premium segments. We have less penetration in the low end, which I think is helpful. And as we go forward, we're continuing to focus on commercial PCs and getting a larger footprint in there.

I will say the enterprise work that we're doing on the server side, I think, links very well to the commercial PC work, and we're continuing to invest in sort of the sales and marketing resources to ramp that side of the business.

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**Joseph Lawrence Moore** - *Morgan Stanley, Research Division - Executive Director*

Great. And then going back to the Genoa question that was asked a second ago, as you are in this kind of budget-conscious environment, you're introducing a chip in a system that has pretty high platform cost. Does that slow the adoption at all? It seems like people -- and your competitors are dealing with some of the same issues. Just how does the current environment affect the rate at which Genoa will ramp?

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**Lisa Su** - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Yes. I would say, Joe, the total cost of ownership benefit of Genoa, particularly in some of the larger cloud workloads, is very, very significant. So I wouldn't say that, that's necessarily slowing the pace of adoption. It is a new platform though. So if you think about when we went from Rome to Milan, it was basically similar platforms. So I would say that, that ramp was a bit faster.

But as it relates to Genoa, we had always expected that Milan and Genoa would coexist through 2023. And that we would have -- we still have Milan instances that are just ramping now, and we expect that will continue through 2023. And so I really view this as the natural thing when we introduce Genoa at sort of the higher core count, that both will coexist. And as some of the platform costs come down, you'll see the Genoa cutover, and that's what I mentioned towards the fourth quarter of 2023.

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**Operator**

Your next question is coming from Ross Seymore from Deutsche Bank.

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**Ross Clark Seymore** - *Deutsche Bank AG, Research Division - MD*

Let me ask a question. And Jean, congrats on the new job. Lisa, I was hoping you could give a little bit of sequential color to just size the magnitude of the 3 segments that are going down in the first quarter and then Embedded going up. And really what I'm getting at there is, in an answer to a prior question, you talked about the mix being a headwind to gross margin. And I think, Jean, you cited Data Center dropping as a percent of the mix. So just trying to get the magnitude of just how much Data Center has to drop to make that outcome on the mix side be true.

**Lisa Su** - Advanced Micro Devices, Inc. - President, CEO & Chair of the Board

Sure, Ross. So let's see. We said the Client and Gaming segments would be seasonal. So you would expect that the Data Center would be more than seasonal. So maybe to help you size that, think about the Data Center sequential drop as double digit, whereas the Client and the Gaming segments are more like single digit, if that helps.

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**Ross Clark Seymore** - Deutsche Bank AG, Research Division - MD

Yes, it does. And anything similarly on Embedded? Is that kind of up single digits?

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**Jean X. Hu** - Advanced Micro Devices, Inc. - Executive VP & CFO

Yes. Yes. Embedded will grow sequentially single digit. Yes.

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**Ross Clark Seymore** - Deutsche Bank AG, Research Division - MD

Got it. Sorry for the nitpicky question. A bigger picture one for you then, Lisa, on competitive intensity. On one hand, I could see that the total cost of ownership benefits of these products, multicore, better performance, et cetera, could lead to higher ASPs, whether you're talking about the Data Center side or your Client business. On the other side, competitive intensity and overall demand is weaker. And at some point, you might even get deflationary costs on the foundry side of things. Can you talk a little bit about the pricing environment given those somewhat contradictory pressures?

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**Lisa Su** - Advanced Micro Devices, Inc. - President, CEO & Chair of the Board

Sure. So maybe let me separate Data Center and Client because they're a little bit different. I think on the Data Center side, we would -- we do see that, in general, the performance, the power performance, the total cost of ownership, selling the solution is the most important piece of it because the solutions are actually quite different in terms of what you can do between sort of 4th Gen EPYC and sort of other solutions. The environment is always competitive, but we feel very good about the overall value proposition that we bring to both cloud and enterprise customers.

I think on the Client side, we've said for the last couple of quarters that the pricing environment is more aggressive. I think that normally happens when the industry is working on rebalancing. I think we're working on rebalancing, our OEM partners are working on rebalancing. The retailers are working on rebalancing. And so there are more incentives and more -- a more aggressive pricing environment.

I view that, that's primarily on, let's call it, older products, let's call it previous generation products. And as we work through that, there will be some normalization as we think about our newer generation products, where there's more capability added. So hopefully, that gives you a little bit of the puts and takes.

And in terms of the cost environment, I think all of us in the industry have seen some elevated costs, but I think we also see -- expect that to normalize, too, as everyone is sort of optimizing their CapEx spending.

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**Operator**

Your next question today is coming from Mark Lipacis from Jefferies.

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**Mark John Lipacis** - Jefferies LLC, Research Division - MD & Senior Equity Research Analyst

Congrats to Jean on the new seat. Two questions, if I may. First, on the PC side. Can you give us a sense about roughly how far under consumption, you believe, you're shipping on the PC side, either in Q4 and Q1?

And Lisa, correct me if I'm wrong, I thought I heard you say in an answer to an earlier question that you expect the PC client just to grow into second quarter. So does that suggest that 1Q, you think, is the bottom on the PC? And then I had a follow-up.

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**Lisa Su** - Advanced Micro Devices, Inc. - President, CEO & Chair of the Board

Sure, Mark. So we -- so the first -- the second question, yes. We do believe the first quarter is the bottom for our PC market -- for our PC business, and we'll see some growth in the second quarter and then a seasonally higher second half.

In terms of the under shipment, I mean, I think we're -- we under-shipped in Q3, we under-shipped in Q4. We will under-ship, to a lesser extent, in Q1. So I think you can infer that from our guidance of single-digit down. And then we'll be back to a more normal environment.

Now just as a reminder, though, the first half is not usually a -- the first half is usually a seasonally weak client time anyways. So we would expect more lift in the second half, not so much in the second quarter.

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**Mark John Lipacis** - Jefferies LLC, Research Division - MD & Senior Equity Research Analyst

Got you. Okay. That's very helpful. And then a follow-up, if I may, on the -- China is lifting, as they're lifting the COVID restrictions, I guess I would imagine that you would expect that ultimately, at some point, to translate into higher demand. And I'm wondering if you could just kind of share with us your thoughts about how that might play out. And could you remind us, to the extent that you can help us understand the risk to the supply side for you in the event that the COVID spreads rapidly as they lift the restrictions and impacts what you have on the supply side there.

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**Lisa Su** - Advanced Micro Devices, Inc. - President, CEO & Chair of the Board

Sure, Mark. So we've done a very good job in our supply chain in terms of risk mitigation. So we have -- we don't believe that we have a significant risk as it relates to COVID future outbreaks, if there are any. As it relates to China recovery, I think we would benefit from a China recovery. It's very difficult to call. I mean we've seen, certainly in our Data Center business, we saw in the second half of the year and last year in the first half of this year that the China Data Center business has been weak for us. If there was a recovery, I think we would benefit from that. Similarly, some of the other consumer patterns as well. But it's very difficult to call. So we put that in the bucket of macro uncertainty, and we'll see how it plays out.

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**Ruth Cotter** - Advanced Micro Devices, Inc. - SVP of Marketing, HR & IR

Operator, we'll take 2 more questions from 2 callers, please.

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**Operator**

Certainly. Our next question is coming from Chris Danely from Citi.

**Christopher Brett Danely** - Citigroup Inc., Research Division - MD & Analyst

Great. Congrats on being the first all-female CEO, CFO team. It's a long time coming. So your gross margins held up pretty well for the Q1 guide despite high-margin Data Center business going down. So if the Data Center business remains weak and has a rough quarter in Q2, can we expect a similar gross margin resiliency?

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**Jean X. Hu** - Advanced Micro Devices, Inc. - Executive VP & CFO

Yes, definitely. I think as I said earlier, the major impact on gross margin actually is the PC Client side. The stabilization and the bottoming of Client on the business really help us with the gross margin at the current level. Second half, we should see the expansion of gross margin.

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**Christopher Brett Danely** - Citigroup Inc., Research Division - MD & Analyst

Sure. And as my follow-up on your PC Client business, so it had its correction a little bit later than some of the other folks in the semi industry and was obviously a little bit steeper. Can you talk about why that happened and why we should or should not expect that? Or could that happen in the Data Center business as well?

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**Lisa Su** - Advanced Micro Devices, Inc. - President, CEO & Chair of the Board

I guess Chris, what I would say is I think the PC market has been volatile, and we did significantly -- coming off the pandemic, there was very high demand during the pandemic, and I think we were all adjusting as we're looking at sort of the demand environment post-pandemic and with macro uncertainty. I think the Data Center business, we have again, our -- we're heavily weighted towards cloud, and we have very good discussions with our overall customer set in terms of what they need. I think what's going in our favor in the Data Center is our workloads are expanding. And so we've heard from all of our cloud customers that they're adopting both Milan and Genoa in more workloads than previous. And so I think that gives us good confidence.

And frankly, the Data Center customers are also giving us good visibility into what they need for 2023. So there is an adjustment in the first half. And I think that's something that we understand. And we also expect that we're going to have to ramp up production in the second half as some of the demand resumes. And I think the overall factor of compute in the cloud being a very important long-term driver is definitely there. So we feel good about sort of where we're positioned.

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**Operator**

Our final question today is coming from Timothy Arcuri from UBS.

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**Timothy Michael Arcuri** - UBS Investment Bank, Research Division - MD and Head of Semiconductors & Semiconductor Equipment

Lisa, I had a question on your Client business. I know that your competitor at times uses rebates and subsidies. But the numbers that are in their filings have gotten pretty vague. So I take it from your answer to a prior question that you think that's more on legacy parts. I guess I'm just kind of wondering what changes or impact that's had on your business. And I continue to hear these worries that it's going to have some lasting effect on your share and particularly on your margins.

**Lisa Su** - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

Sure, Tim. So let me make a couple of points. I think all of us, as we participate in the PC industry, there are various parts of the ecosystem that we work with. We work with our OEMs, we work with our retail partners, we work with our distribution and channel partners. And we're all working together to work through sort of the elevated inventory levels. As I said, I think we've made good progress on that. And I think we have much better visibility into the various pieces.

As it relates to the pricing environment, I do believe that the pricing environment is -- particularly when you're clearing older inventory or older-generation products, is a bit more competitive. And we see that. As we look forward, the way we're modeling the Client business is that we are modeling gross margins to be less than corporate average. That's different than our previous modeling.

So previously, Client was more like at corporate average. And I think given the -- I think the nice thing is our business is quite a bit more diversified now. And so with our Data Center, Embedded businesses really being strong growth drivers, I think Client continues to be a good market overall. And as we work through this, we will see some of the normalization that Jean mentioned.

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**Timothy Michael Arcuri** - *UBS Investment Bank, Research Division - MD and Head of Semiconductors & Semiconductor Equipment*

And then I guess just as the last thing, you went through some puts and takes on the different pieces for the year, but I just wondered if I could just get you to kind of give a bias for what you think that the revenue for the year is the bias. It sounds to me like the bias is more up than down, but I just wanted to give you a chance to maybe confirm that or not.

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**Lisa Su** - *Advanced Micro Devices, Inc. - President, CEO & Chair of the Board*

I think Tim, the answer is yes. But again, let's work through the next couple of quarters. And we feel good about how our products are positioned, and we just need to work through the macro and see how that plays out.

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**Ruth Cotter** - *Advanced Micro Devices, Inc. - SVP of Marketing, HR & IR*

Great. Thank you. That concludes today's earnings call. Again, welcome to Jean, and we're delighted to have her on board, and much gratitude to Devinder for his 39 years of service and all his leadership. And we look forward to touching base with all participants throughout the quarter. Thank you.

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**Operator**

Thank you. That does conclude today's teleconference and webcast. You may disconnect your line at this time, and have a wonderful day. We thank you for your participation today.

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