Why doesn't the Fiero, for example, have to run a big tire pressure differential? It's almost identical weight distribution-wise, and yet the door sticker calls for 30 psi both front and rear. The late model Corvair , on the other hand, calls for 18 front and 30 rear (hot).

Response:
Weight distribution is just part of the picture. For a very good explanation of this topic, Jim Hall wrote a couple articles (What Makes Cars Handle? parts I and II) in Car and Driver magazine in April and May 1965 you might be able to unearth. Jim Hall was the smart guy out of Midland, Texas who built the Chaparral race cars.

All tires have a slip angle when they're turning corners, there's a difference between the actual path they take and the exact angle they're being steered, the wider path taken by the tire is determined by the additional 'slip' and the difference between the two is slip angle. Slip angles are carefully controlled on cars because its important they're very similar on both ends of the car, a slightly larger slip angle on the back will turn in to ferocious oversteer at speed and a small amount of extra slip on the front deteriorates into extreme plowing understeer at high speed. The ideal is to minimize slip generally, and maintain a slightly greater amount of front slip under most circumstances so that the driver has the option of modulating slip angles himself with the throttle. Because at high speeds the car is traveling hundreds of feet per second small changes make gigantic differences to what side of the road you end up on and which way you're facing that wouldn't be an issue at modest speeds.

Tire slip angles are determined by the load carrying abilities of the tire compared with the load they are seeing at a given moment and job they're being asked to do. Bigger tires or more air pressure reduce slip angles and smaller tires or lower air pressure increase slip angles. The more weight or cornering, acceleration and braking loads you're expecting a tire to carry, the greater its slip angles. In a car with a lot of weight at one end you have some options for reducing the slip angle of the tires on the 'heavy' end: larger tires and/or higher tire pressure and/or reducing roll stiffness. Roll stiffness is the resistance of the car body to lean in corners. Suspensions can be designed to not resist or strongly resist the effect of the body lean in corners. Adding roll stiffness (resistance to leaning) increases slip angles on the end of the car that's resisting the roll. Because roll is proportional to cornering forces this allows the suspension engineers to tune the chassis to make the most of the cornering power at both ends of the car by progressively shifting loads in corners to the end of the car with the smallest slip angles; the roll is carried on the end that has extra traction. The effect of resisting the body lean by a stiff spring or sway bar is that the tire on the outside of the turn carries an ever-increasing share of the load, which increases its slip angle, and promotes neutral handling.

GM got their fingers burned bad enough on the Corvair viz tire pressure differentials that I would imagine they were loathe to suggest staggered tire pressures on the Fiero. So, they found other ways to equalize the slip angles on the Fiero, namely

putting most of the roll stiffness in the front suspension to force it to carry roll loads and generate higher slip angles when the car was pushed in corners to make sure the tail didn't get away. The early Corvair has tremendous rear roll stiffness and swing axles don't let you reduce it much, even with softer springs and considerably increased front roll stiffness, so tire pressures were pretty nearly the only tool that would really make a difference on earlies - the lates have very weak rear roll stiffness and this is mostly why they are inherently better handling cars. Most efforts to tame the Corvair are focused on increasing front roll stiffness to transfer cornering loads onto the front wheels to minimize the possibility the rear will generate larger slip angles than the front.

GM makes a few other vehicles with very similar weight distribution to the Corvair that are generally regarded as safe and not inherent oversteering machines - the small block Corvette for many years was pretty close to the Corvair weight distribution, most full sized station wagons also are, and any moderately loaded pickup truck is. The 1971-1976 GM B body station wagons have virtually identical suspension geometry to the late Corvair despite a very different looking suspension (leaf springs in the back). It's designed to minimize roll resistance and transfer loads to the front wheels in cornering, and has about the same roll axis as the 1965 Corvair.

I would encourage you to track down Jim Hall's article if you can find it, I imagine someone on VV might be able to scan you a copy, for a fuller understanding of the subject.

Hope that was some help,

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